Railroad Age Gazette

DAILY EDITION

VOL. XLVI NEW YORK—JUNE 16, 1909—ATLANTIC CITY No. 24A

PUBLISHED DAILY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK
On the occasion of the Annual Conventions of the Master Car Builders' and American Railway Master Mechanics' Associations.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada .....$6.00 a year
Foreign Edition, London.....£1 12*s.* ($8.00) a year
Single Copies.....15 cents each

If mailed from Atlantic City the postage on this copy of the *Daily Railroad Age Gazette* is seven cents. Unless the full amount is affixed to the wrapper or envelope, the post office will not forward the paper.

Application made at the Post Office at New York for entry as mail matter of the second class.

It is announced that the Virginian Railway has hauled a train of 80 cars of 100,000 lbs. capacity from the summit of the Alleghanies to Tidewater, the maximum adverse grade about 0.2 per cent. compensated, and the total weight of coal, 4,310 long tons. This, we believe, is the record haul of its kind, but it tallies exactly with the plans of the Rogers' engineers in laying out the road and in designing the equipment. We published in the *Railroad Gazette*, March 15, 1907, a statement from an officer of the road to the effect that a single locomotive would be able to take a train of this size all the way to Tidewater from the assembling yard at the edge of the coal fields, except at two points, where pushers would be used. The grades are so regulated that the empties can be hauled back by a single engine in trains of the same length.

The program for the Master Mechanics meetings looks interesting, but the showing made by the reports of committees is not large and measured by the number of pages they occupy, not much time will be required for their presentation. The subjects of most of the reports are not of very great importance and they are not likely to invite animated discussion. The individual papers are of such a high character that they will add materially to the value of the proceedings. The report of the committee on superheaters is so brief that it is fortunate that void left in this way is well filled by Prof. Goss' masterly treatment of the subject. The "transfer" of heat which is to be discussed by Prof. Lucke is a subject which is occupying the attention of scientist and engineers more than ever and a proper understanding of it is necessary to those who hope to make any marked improvement on locomotive boiler performance. The topical discussions cover a good variety of subjects of live importance and there is opportunity in some of them for an exposure of diverse opinions. Taking all together the convention program provides ample material for three days' work, but it can be done comfortably and without any overtime charges.

At a recent meeting of the Master Boiler Makers' Association there was a discussion upon boiler tubes that centered around the respective values of steel and charcoal iron. As usual, under such circumstances, this discussion consisted, for the most part, of personal experiences, and the opinions based thereon were almost as numerous as the speakers. One speaker found steel increasing the life of tubes by 25 per cent., while another found the only cure for jutting to lie in the use of iron. The facts probably were that no two men were working tubes under exactly the same conditions, and we know very little of the effects of changed conditions. It might be worth while for the Master Mechanics' Association to make a real investigation of the relative values of the two classes of tubes. As matters stand, we know little or nothing about the effect of water, or of acid and alkaline reactions on steel and iron, nor do we know what influence the percentage of carbon has. Is there a galvanic corrosive action set up by welding a steel safe end to an iron tube or *vice versa*? Does steam temperature or pressure affect the tubes and their corrosion? There are still plenty of things to be found out about boiler tubes—things which will go far toward explaining and reconciling these wide differences of opinion, based on personal experience with which we are now confronted.

Twenty years ago the Master Mechanics' convention was held at Niagara Falls. J. H. Setchel of the Pittsburgh Locomotive Works was then President. Prominent among those taking part in the discussions were J. N. Lauder, James M. Boon, Wm. Wilson and J. C. McCrum. At that time a larger axle than the 3¾-in. x 7-in. journal was necessary for the larger tenders and a 4-in. x 8-in. journal was recommended by a number of members. By letter ballot the same year the M. C. B. Association adopted the 4¼-in. x 8-in. journal for 60,000-lb. cars. A committee on the best proportion of grate and tube area reported that the subject was one requiring extensive experiment, and a grant from the National Treasury would be necessary to cover the heavy expense. The chairman of the committee, however, J. Davis Barnett, ventured the opinion that a square foot of tube heating surface at the forward end has only about 1/14 of the efficiency of a square foot of firebox surface. Boiler design was then a live subject, and a committee reported on the question whether the water space surrounding the firebox and tubes was large enough for free circulation, and the majority of those reporting said that they had increased the width of the mudring from 2½ and 3 in. to 4 in., resulting in greater durability of firebox sheets and decidedly freer steaming boilers. The committee had heard of a device for the purpose of enforcing rapid circulation and equalization in a locomotive boiler and thought that such improvements should be seriously considered. Stacks, nozzles and spark arresters formed the subject of an interesting discussion. They had then reached the stage where many locomotives were equipped with extended smoke boxes, and it was thought possible to use a straight stack with a short smokebox. The medium length smokebox was not then suggested and the self-cleaning appliances had not been introduced. Carelessness and neglect in not answering circulars of inquiry were as prominent then as now, and a resolution was adopted by a rising vote, "that it is the duty of every member engaged in railway service to answer all circulars of inquiry issued by committee on investigation."

MACHINE TOOLS FOR RAILWAY SHOPS.

The chief peculiarity of railway shops which distinguishes them from those owned by manufacturing companies is the fact that they are not operated for direct profit, and costs and selling price are not essential to their successful operation. While some of the larger roads have a system of labor and material charges which enables them to know approximately the cost of various locomotive and car details, many of them do not regard such accounts as necessary. This ignorance of cost and absence of any seeming need of knowing cost has its effect on the character of the machine tools used and on the management of machinist labor. Where there is little responsibility as to the cost of manufacture, there is naturally low efficiency, and old tools are kept in service long after they have outlived their economic period. The same is true of machinist labor. Some railway shops have adopted piece work or some form of premium system for a wage system, but many more are on an hour or day basis. Even in shops which are prominent because of the betterment systems in use, the work moves in a leisurely manner, and in a large shop in the East where high speed steel was first introduced and all kinds of stop-watch hurry-up schemes were used, there is now about as much loafing and soldiering as in a well managed shop on a day wage basis.

In the plans for a large locomotive machine and erecting shop, made some years ago, it was estimated that the power required for the tools in the machine shop and for two traveling cranes for lifting locomotives would be 150 h.p. This was transmitted through the machine shop by two shafts each for 75 h.p. The shop, 300 ft. x 60 ft., is well filled with machine tools, driving wheel lathes, planers, slotters, milling tools, drills, etc. The traveling cranes are now driven by electric motors, but the two shafts with their 14-in. main bolts are still driving all the machine tools.

The total power used in a machine shop may be taken as a fair measure of the shop's output so far as machining of metal is concerned, and a large shop which uses only 150 h.p. on its machine tools cannot have a large output in manufacturing. All this power would be absorbed by two milling machines on heavy slabbing work; and some individual machines in modern locomotive shops absorb as much as 100 h.p. How feeble, then, must be the work of the individual tools, and how very small the output of a locomotive shop which only requires 150 h.p. to drive it! This case is typical of many railway shops, and it is possible for them to operate in this way because they do little or no new work and the bulk of the work is on repairs which is largely a matter of taking up wear.

As the smaller roads are consolidated into large systems, the shop work is also consolidated, and it is possible to establish manufacturing plants on the factory system for new work; and it is here that the demand will be for the high power tools Another effect of consolidating the requirements in standard details of a number of division shops at one central point, is, that the number of pieces, such as pins, studs, machine bolts, etc., becomes so large that it is possible and profitable to employ automatic machines, and these are gradually being introduced into railway shops in increasing numbers.

The unit taken for various ratings of a locomotive repair shop is the repair pit, or space occupied by one locomotive, as it is obvious that the machine shop space, number of machines, etc., depends upon the number of locomotives under repair and turned out each month. The generator capacity for a shop driven by electric motors is approximately 15 k.w. per pit, including tools, cranes, heating fans, and, in fact, all current except that for lighting. The machine tools require 10 k.w. per pit, blower and exhaust motor 5 k.w. per pit, while 3 k.w. per pit will be sufficient for shops and adjacent yard lighting. A locomotive shop should have about 6 machine tools per pit, and the space required for tools averages 1,300 sq. ft. per pit.

The horsepower required at the motor per pound of metal removed per minute for lathes, planers, boring mills and similar tools with tool post and single cutting edge, has been measured very accurately by Dr. Nicholson at Manchester, England, and the following averages may be used:

Wrought iron or soft steel.....	2.4	h.-p.	per lb.	per min.
Hard steel	2.65	"	"	"
Cast iron, soft or medium.....	1.00	"	"	"
Cast iron, hard	1.36	"	"	"

The weight of turnings and cuttings per hour is thus a fair measure of the shop's output, and for roughing tools it may be taken as a good measure of the efficiency of the machine tool and the industry of the operator. It would be an interesting index and a check on operation to weigh up occasionally the turnings and cuttings per hour from each machine on roughing work, and for the whole shop.

The proper measure of a machine tool's capacity is the weight of metal removed per minute or per hour, and specifications for tools which perform roughing operations should include such requirements. While this important item is not yet in general use for tool specifications, they are often guaranteed to perform a definite service measured in that way. Thus, the heavy slab milling tools for locomotive side and main rods are driven by 65 h.p. motors and remove metal at the rate of 70 cu. in. per min., which is equal to more than one-half of a ton of steel per hour, and is one instance where the machinery for finishing locomotive parts approaches in quantity and efficiency that of a big gun factory.

The electrification of railway shops often leads to the introduction of new tools, as it is then possible to order the most improved direct motor drive tools. It is not always necessary to build and equip an expensive power house in order to drive a railway shop by electricity, as current is often available from outside sources. Thus, the large new Battle Creek shops of the Grand Trunk have a small power house with a small generator for emergency and lighting, but the bulk of the current is obtained from a hydro-electric plant at Jackson, Mich., 45 miles distant. The old shops of the Wabash at Moberly and at Fort Wayne have been electrified at comparatively small expense, and with a substantial saving in cost of operation, by dispensing with isolated boilers and engines, each of which required attendants.

In regard to the kind of tools for a locomotive machine shop, this can be well indicated by giving a brief summary of the estimate prepared by L. R. Pomeroy for the new Delaware, Lackawanna & Western shops at Scranton. These shops are intended to have a capacity per month for 30 locomotives under general repairs, 8 under light repairs, and for building 4 new locomotives. The totals in this list show 9 large special machines for driving wheels, 50 lathes, 22 planers, 6 slotters, 11 boring machines, 13 millers, 29 drills, 9 grinders, 5 shapers and 14 small miscellaneous machines for tool room, making a grand total of 168 machine tools.

Among the railway shops now building or under consideration which will require a considerable number of machine tools are the following:

The Delaware & Hudson is asking for data on machine tools for a new shop to be built at Green Island, near Troy, N. Y.

The Wheeling & Lake Erie has completed plans for new shops at Brewster, Ohio, to take the place of those at Norwalk, Ohio, which were burned. The Brewster shops and locomotive terminal will cost about $2,000,000.

The Central of Georgia has decided to erect extensive shops at Macon, Ga., which will be several times the size of those operating in that city and which will cost $1,000,000.

The Southern Pacific has commenced the construction of new car shops at Roseville, about 100 miles from San Francisco. The main shop will be 1,500 ft. long and 150 ft. wide, and is to be equipped with a full line of modern tools for wood and iron work.

The Bessemer & Lake Erie will build a new car shop at Greenville, Pa.

The Boston & Maine has prepared plans for new car and locomotive shops to be built at Somerville, Mass.

The Grand Trunk Pacific has under way at Winnipeg, Man., a locomotive shop 147 ft. x 823 ft.

The Hocking Valley has bought 50 acres of land for new shops at Logan, Ohio.

The new D., L. & W. locomotive shops at Scranton, Pa., are about completed and the big tool list has been prepared. The machine and erecting shop is 346 ft. x 582 ft., and as it is intended to build new locomotives at this shop, some heavier tools will be required than are ordinarily used for repairs.

Plans have been completed by the Pittsburgh & Lake Erie Railroad for extensive improvements and extensions to the car shops at McKees Rocks, Pittsburgh, and a large portion of the cars and locomotives used on that road will be built at these shops when the improvements are completed.

The New York Central has appropriated $500,000 for the construction of machine shops on a large tract of ground which it recently purchased at Corning, N. Y.

CONSOLIDATION LOCOMOTIVE FOR THE WABASH-PITTSBURGH TERMINAL WITH COLE SUPERHEATER.

In the issue of the *Railroad Age Gazette* for May 7 there was published a description of the latest design of Cole superheater as installed by the American Locomotive Co. The illustrations presented herewith show a special application of the device to a consolidation locomotive that has recently been built for the Wabash-Pittsburgh Terminal. As was noted in the previous description, the superheater is a distinct departure from previous designs used in the United States and Canada and is arranged for giving a superheat of from 100 deg. to 125 deg. In the illustrations the construction of the side headers is shown more clearly than in those published on May 7. The steam, entering from the dry pipe, passes into the chambers C in the header casting and thence out to the superheater pipes at A, returning at B, and thence to the chamber D leading to the steam chests. A plan view is also given showing the arrangement of the pipes running from the firetubes to the header, and this, in connection with the reproduction of the photograph already published, will give a clear idea of the simplicity and accessibility of the design.

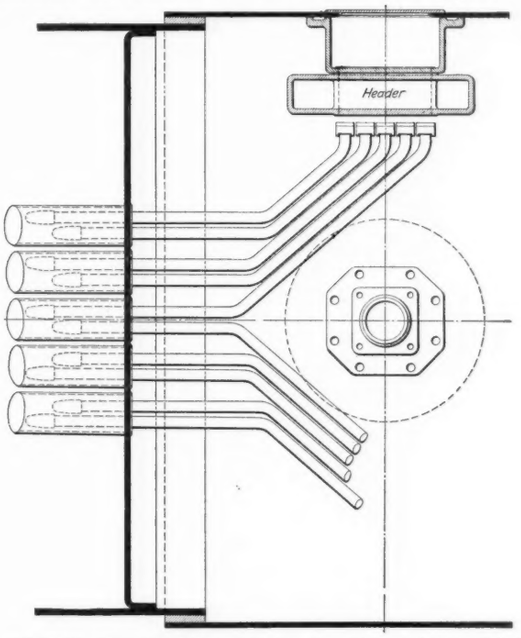
The ball joint principle of ground joints has been used for the connections between the superheater pipes and the side headers, and all soft joints of copper or composition have been eliminated, as it is well known that brass or copper deteriorates rapidly with high temperatures. The ends of the superheater pipes are upset and machined to form a ball, and ground to a steam tight joint with the socket in the steam headers.

The inlet and outlet pipes of each superheater unit are connected together by a gland and secured to the header by means of a single bolt which passes through the header and box casting with the nut and screw thread inside of the box casting. Covered openings are provided in the smoke-box sheet to give access to these bolts from the exterior of the smoke-box.

The passage of gases through the 5¼-in. tubes and around the superheating pipes is controlled in the usual manner by a damper which is automatically operated by a piston working in a vertical cylinder, having a pipe connection with the steam chest. When the throttle is open, the pressure in the steam chest forces the piston upwards and opens the damper which is closed again by a counterweight as soon as the throttle is closed.

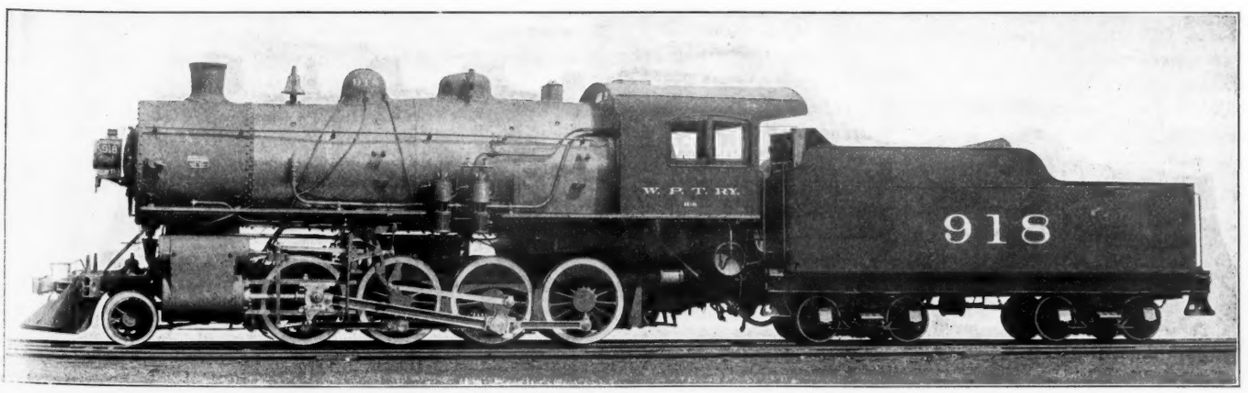
This design of superheater presents several important advantages over former designs with vertical headers:

It reduces the number of steam joints for inspection and maintenance; gives complete freedom for the expansion and contraction of the superheater tubes; renders the joints between the superheater tubes and the steam headers more accessible; protects the nuts and screw threads of the bolts securing the superheater pipes to the header from corrosion by the hot gases and leaves the boiler tubes easily accessible for cleaning and calking.



Plan of Cole Superheater Tubes in Smokebox; Wabash Pittsburg Terminal.

The locomotive to which this application is made is of the same general design as the other engines in the order except for such modifications as were necessary because of the use of superheated steam. In order to obtain the full advantage from the superheated steam, large cylinders were used and the



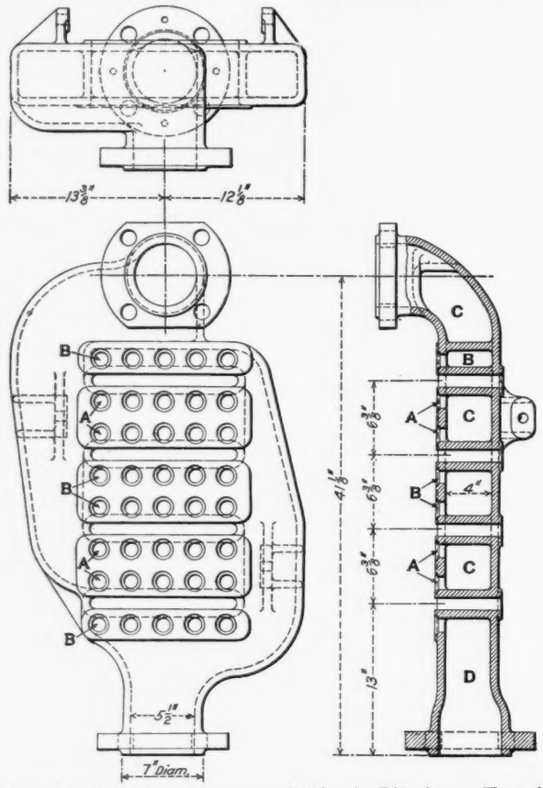
Consolidated Locomotive for Wabash Pittsburg Terminal Equipped with Cole Superheater.

working pressure was correspondingly reduced. The diameter of the cylinders was increased from 22 in. in the sister engines to 25 in., the stroke in both cases being 32 in. and the boiler pressure was reduced from 200 lbs. to 160 lbs. The cylinders of both classes of engines are bored to the same diameter and a bushing 1½ in. thick is inserted in those of the engines using saturated steam, thus providing for equipping them with a superheater, in case this should be deemed advisable in the future. Except for these changes and the necessary modifications in the boiler design for the introduction of the superheater apparatus, the two classes of engines are practically identical in design.

In working order the engine under consideration has a total weight of 236,000 lbs., of which 207,000 lbs. is carried on the driving wheels.

Superheated steam is distributed to the cylinders by means of 14-in. piston valves, actuated by the Walschaerts valve gear. The valves are designed with 1-in. steam lap and no exhaust lap or clearance, and are set for $\frac{3}{16}$ in. lead.

The driving wheels are 58 in. in diameter, which, with the boiler pressure and size of cylinders above mentioned, gives a tractive power of 46,900 lbs., which is 1,500 lbs. greater than that of the engines using saturated steam. The frames are of cast steel with double front rails and are very rigidly braced together.



Header for Cole Superheater; Wabash Pittsburg Terminal.

The boiler is of the radial stayed extended wagon top type with wide fire-box and is 80 in. in diameter outside at the front end. It is equipped with 358 2-in. tubes, 14 ft. 6 in. long, and with 20 5¼-in. tubes of the same length which contain the superheating pipes. The total heating surface of the boiler is 3,283 sq. ft., of which the tubes contribute 3,093 sq. ft. and the fire-box the remainder. The superheating surface is 374 sq. ft. The fire-box is 109 in. long by 68 in. wide with sloping back head and throat sheet and provides a grate area of 50.5 sq. ft.

The following are some of the principal dimensions and ratios of these engines:

Cylinder, diameter	25 in.
Piston stroke	32 "
Wheel base, driving	15 ft. 9 in.
" " total	25 " 0 "
" " engine and tender	59 " 11 "
Weight on drivers	207,000 lbs.
" total	236,000 "
" engine and tender	390,000 "
Heating surface, tubes	3,093 sq. ft.
" firebox	190 "
" superheater	374 "
" total	3,283 "
Grate area	50.5 "
Boiler diameter	80 in.
Boiler, thickness shell	13/16-in. and 7/8-in.
Firebox, width	68 in.
" length	109 "
" thickness, crown, sides and back	5/16-in.
" thickness tube sheet	½-in.
" water space	5-in.
Tubes, material	Charcoal iron
" number	(20) 5¼-in.; (358) 2-in. diameter
" length	14 ft. 6-in.
" thickness	(2 in.) No. 11, B. W. G.
" thickness	(5¼ in.) 5/16-in.
Wheels, diameter, driving	58 in.
" " truck	33½ "
" " tender	33 "
Tank, capacity, water	8,000 gals.
Coal capacity	14 tons
Tractive effort	46,900 lbs.

$$\frac{\text{Weight on drivers}}{\text{Total weight}} = 87.71^*$$

$$\frac{\text{Weight on drivers}}{\text{Tractive effort}} = 4.41$$

$$\frac{\text{Total weight}}{\text{Tractive effort}} = 5.03$$

$$\frac{\text{Tractive effort x diameter drivers}}{\text{Heating surface}} = 828.57$$

$$\frac{\text{Heating surface}}{\text{Grate area}} = 65.01$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 5.78^*$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 63.05$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 71.88$$

$$\text{Displacement, 2 cylinders, cu. ft.} = 18.18$$

$$\frac{\text{Heating surface}}{\text{Displacement, 2 cylinders}} = 180.58$$

$$\frac{\text{Grate area}}{\text{Displacement, 2 cylinders}} = 2.77$$

*Per cent.

ENTERTAINMENTS.

The regular program for the two weeks of the convention as laid out by the Entertainment Committee is as follows. Special announcements in connection with some of the events will be printed in later issues of "The Daily."

Wednesday, June 16.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Band concert, Hippodrome, New Pier.

9 p.m.—Reception by the president and officers of the American Railway Master Mechanics' Association in the Blenheim Exchange, Marlborough-Blenheim Hotel. (Orchestra and soloist.)

10.30 p.m.—Dancing, ball room, Marlborough-Blenheim Hotel. (Orchestra.)

Thursday, June 17.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Band concert, Hippodrome, New Pier.

4 p.m.—Recital, Mary Jordan FitzGibbon, contralto, ball room, Marlborough-Blenheim Hotel.

9.30 p.m.—Forty-second annual ball of the American Railway Master Mechanics' Association, Entrance Hall, New Pier.

Friday, June 18.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.
3.30 p.m.—Orchestra concert, Entrance Hall, New Pier.
3.30 p.m.—Band concert, Hippodrome, New Pier.
4 p.m.—Informal musicale by convention ladies, ball room, Marlborough-Blenheim Hotel.
9 p.m.—Concert, Mendelssohn Club of Philadelphia of 100 voices, Entrance Hall, New Pier.
10.30 p.m.—Informal dancing, ball room, Marlborough-Blenheim Hotel. (Orchestra).

Saturday, June 19.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.
2 p.m.—Baseball parade from New Pier to special trolley cars.
3 p.m.—Baseball game, Master Mechanics and Master Car Builders vs. Supply Men, Pennsylvania Railroad Co.'s Inlet Park Baseball Grounds.
8.30 p.m.—Band concert, New Pier.
9 p.m.—Euchre party for convention ladies, ball room, Marlborough-Blenheim Hotel.

Sunday, June 20

11 a.m. and 9 p.m.—Special programme by Marlborough-Blenheim Orchestra, Mary Jordan FitzGibbon, contralto, Blenheim Exchange, Marlborough-Blenheim Hotel.
11.30 a.m., 3.30 p.m. and 8.30 p.m.—Band concerts Philippine Constabulary Band, New Pier.

Monday, June 21.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.
3.30 p.m.—Orchestra concert, Entrance Hall, New Pier.
3.30 p.m.—Band concert, Hippodrome, New Pier.
4 p.m.—Costume musicale, the Misses Hoyt, ball room, Marlborough-Blenheim Hotel.
9 p.m.—Reception by the president and officers of the Master Car Builders' Association in the Blenheim Exchange, Marlborough-Blenheim Hatel. (Orchestra and soloist.)
10.30 p.m.—Dancing, ball room, Marlborough-Blenheim Hotel. (Orchestra).

Tuesday, June 22.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.
3 p.m.—Afternoon at the Country Club, for the convention ladies. (Orchestra).
3.30 p.m.—Band concert, Hippodrome, New Pier.
9.30 p.m.—Forty-third annual ball of the Master Car Builders' Association, Entrance Hall, New Pier.

Wednesday, June 23.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.
3.30 p.m.—Band concert, Hippodrome, New Pier.
8.30 p.m.—Band concert, New Pier.

The Philippine Constabulary Band of 84 pieces, Capt. Walter H. Loving, conductor, by courtesy of Captain Young, of Young's New Million Dollar Pier, will give concerts every day during the convention at 3.30 p.m. and 8.30 p.m., and on Sunday at 11.30 a.m.

By special arrangement the orchestra music for the daily morning and afternoon concerts in Entrance Hall, the receptions, informal dances and the balls will be furnished by this famous band. Orchestra at each ball will consist of 42 pieces until after the regular concert in the Hippodrome, when the full strength of the band (84 pieces) will play the dance programs.

The Transportation Committee has engaged an ample supply of roller chairs for use free by the members and guests of the convention. Stations have been established at the main entrance of the New Pier, at the Marlborough-Blenheim Hotel and at Chalfonte; and chairs may be had at the first mentioned station from 9 a.m. to 7 p.m. every day, and at the Marlborough-Blenheim and Chalfonte hotels between 9 a.m. and 6 p.m. A special service will be provided in connection with the M. M. and M. C. B. balls, when chairs may be had at all three stations between 8.30 p.m. and 10 p.m. Unoccupied chairs may be stopped anywhere on the Board Walk, except between the Marlborough-Blenheim Hotel and the pier. No chairs will be allowed to wait more than 15 minutes en route.

The Country Club of Atlantic City, located at Northfield, has extended the privileges of the club house and grounds to those in attendance at the convention.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.

The interests of the railway supply men represented at the annual conventions of the American Railway Master Mechanics' and Master Car Builders' Associations are centered in the Railway Supply Manufacturers' Association, whose

Alexander Turner.
President.

affairs are, in turn, administered by an Executive Committee of twelve members representing seven districts. The present committee is organized as follows:

First District—New England states; one member: Frank A. Morrison, Mason Regulator Company, Boston, Mass.

Second District—New York and New Jersey; three mem-

R. H. Weatherly.
Treasurer.

bers: Alexander Turner, Galena Signal Oil Company, Buffalo, N. Y.; A. L. Whipple, Forsyth Brothers Company, New York City, and Thomas Aldcorn, Chicago Pneumatic Tool Company, New York City.

Third District—Pennsylvania, Maryland, District of Columbia and West Virginia; two members: Edward M. Grove, McConway & Torley Company, Pittsburgh, Pa., and B. E. D. Stafford, Flannery Bolt Company, Pittsburgh, Pa.

Fourth District—Ohio, Indiana, Michigan, Kentucky and

Arthur C. Langston.

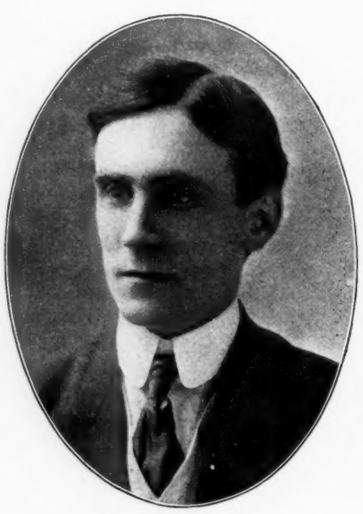
B. E. D. Stafford.

L. R. Phillips.

Thomas Aldcorn.
Chairman, Exhibit Committee.

S. P. Bush.
Chairman, Finance Committee.

George A. Cooper.



F. A. Morrison.

Edward M. Grove.

Members of the Executive Committee of the Railway Supply Manufacturers' Association.

Tennessee; two members: George A. Cooper, Frost Railway Supply Company, Detroit, Mich., and S. P. Bush, Buckeye Steel Castings Company, Columbus, Ohio.

Fifth District—Illinois, Wisconsin, Iowa and Minnesota; two members: W. H. Miner, W. H. Miner Company, Chicago, Ill., and L. R. Phillips, National Tube Company, Chicago, Ill.

Sixth District—Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi; one member: A. C. Langston, Jenkins Brothers, Atlanta, Ga.

Seventh District—States west of Mississippi river, including Louisiana, but excepting Iowa and Minnesota; one member: R. H. Weatherly, who represents this district, was with the Scullin-Gallagher Iron & Steel Company, St. Louis, at the time of his election to the Executive Committee. He is now President of The Pilliod Company, with office in Chicago; but as Mr. Weatherly is also treasurer of the association and

A. L. Whipple.
Vice-President.

as his term as a member of the Executive Committee expires this year, it was decided to make no change before the annual meeting.

Four members retire with each annual meeting, when their successors are elected to three-year terms. This year five vacancies must be filled. At the last annual meeting Samuel G. Allen, Franklin Railway Supply Company, was elected from the third district, but resigned early this year because he moved his business headquarters from Franklin, Pa., to New York City, which is in the second district. B. E. D. Stafford, Flannery Bolt Company, Pittsburgh, Pa., was appointed to fill the office until the coming annual meeting, at which time either he will be elected for the full term or a successor will be chosen. The four others who will retire this year are F. A. Morrison (first district); Alexander Turner (second district); George A. Cooper (fourth district), and R. H. Weatherly (seventh district).

The task of the Executive Committee of the Railway Supply Manufacturers' Association is not an easy one at any time; and this past year was no exception. Working on the principal that there is always room for improvement over the way the committee for the previous year did things in itself sets a pace that is hard to follow—and that is just what every committee has done for some years past. The result is clearly reflected in the increased beauty of this year's exhibit and in the way in which all matters effecting the interests of the supplymen are being handled. It is not conceivable, therefore, that anyone will envy those chosen to do the work for the coming twelve months.

The annual meeting of the association will be held in the meeting hall on the new pier Saturday of this week (June 19) at 11 o'clock a.m.

OFFICERS OF THE MASTER MECHANICS' ASSOCIATION FOR 1908-1909.

President—H. H. Vaughan, Canadian Pacific, Montreal, Can.
First Vice-President—G. W. Wildin, New York, New Haven & Hartford, New Haven, Conn.
Second Vice-President—C. E. Fuller, Union Pacific, Omaha, Neb.
Third Vice-President—J. E. Muhlfeld, Baltimore, Md.
Treasurer—Angus Sinclair, New York.
Secretary—Jos. W. Taylor, 390 Old Colony Building, Chicago.
Executive Members:
C. A. Seley, Chicago, Rock Island & Pacific, Chicago.
John Howard, New York Central & Hudson River, New York.
F. M. Wythe, New York Central Lines, New York.
H. T. Bentley, Chicago & North Western, Chicago.
T. Rumney, Erie, New York.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.

OFFICERS OF THE MASTER CAR BUILDERS' ASSOCIATION FOR 1908-1909.

President—R. F. McKenna, Delaware, Lackawanna & Western, Scranton, Pa.
First Vice-President—F. H. Clark, Chicago, Burlington & Quincy, Chicago.
Second Vice-President—T. H. Curtis, Louisville & Nashville, Louisville, Ky.
Third Vice-President—Le Grand Parish, Lake Shore & Michigan Southern, Cleveland, Ohio.
Treasurer—John Kirby, Adrian, Mich.
Secretary—Jos. W. Taylor, 390 Old Colony Building, Chicago.
Executive Members:
D. F. Crawford, Pennsylvania Lines, Pittsburgh, Pa.
J. F. Walsh, Chesapeake & Ohio, Richmond, Va.
C. A. Schroyer, S.C.D., Chicago & North Western, Chicago.
J. E. Muhlfeld, Baltimore & Ohio, Baltimore, Md.
C. E. Fuller, S.M.P., Union Pacific, Omaha, Neb.
H. D. Taylor, S.M.P., Philadelphia & Reading, Reading, Pa.

PROGRAM M. M. ASSOCIATION.

Opening Session.

Wednesday, June 16, 1909, 9:30 a.m. to 1:30 p.m.

Prayer	9:30 a.m. to 9:35 a.m.
Address of president	3:35 a.m. to 9:45 a.m.
Intermission	9:45 a.m. to 9:55.a.m.
To allow those who desire to retire.	
Action on minutes of 1908 convention	9:55 a.m. to 10:00 a.m.
Reports of secretary and treasurer	10:00 a.m. to 10:15 a.m.
Assessment and announcement of dues; appointment of committees on "Correspondence," "Resolutions," "Nominations," "Obituaries," etc.	10:15 a.m. to 10:25 a.m.
Election of auditing committee	10:25 a.m. to 10:30 a.m.
Unfinished business	10:30 a.m. to 10:35 a.m.
New business	10:35 a.m. to 10:45 a.m.
Discussion of reports on:	
"Mechanical Stokers"	10:45 a.m. to 11:00 a.m.
"Revision of Standards"	11:00 a.m. to 11:30 a.m.
"Motor Cars"	11:30 a.m. to 12.00 m.
Topical discussion:	
1.—"Is the additional cost of flexible staybolts justifiable?" To be opened by H. D. Brown, Erie	12:00 m. to 12:30 p.m.
2.—"Is the usual front row of crown bolts in a locomotive boiler beneficial or otherwise?" To be opened by C. A. Seley, Rock Island Lines	12:30 p.m. to 1:00 p.m.
Discussion of:	
Individual paper on "Bank vs. Level Firing." By E. D. Nelson, Pennsylvania	1:00 p.m. to 1:30 p.m.
Adjournment.	

Middle Session.

Thursday, June 17, 1909, 9:30 a.m. to 1:30 p.m.

Discussion of reports on:	
"Castle Nuts"	9:30 a.m. to 10:00 a.m.
"Safety Valves"	10:00 a.m. to 10:15 a.m.
"Superheaters"	10:15 a.m. to 10:30 a.m.
Discussion of individual paper on "Locomotive Performance under Saturated and Superheated Steam." By Prof. W. F. M. Goss	10:30 a.m. to 12:00 m.

Topical discussions:
(1).—"Vanadium Steel. Have the advantages claimed and shown in laboratory tests been substantiated in practice, particularly as regards the strengthening of locomotive parts?" To be opened by W. C. A. Henry..... 12:00 m. to 12:30 p.m.
(2).—"Are by-pass valves necessary on piston-valve locomotives?" To be opened by H. T. Bentley, Chicago & North Western ..... 12:30 p.m. to 1:00 p.m.
Discussion of reports on:
"Widening Gages on Curves" ..... 1:00 p.m. to 1:15 p.m.
"Steel Tires" ..... 1.15 p.m. to 1:30 p.m.
Adjournment.

Closing Session.

Friday, June 18, 1909, 9:30 a.m. to 1:30 p.m.

Discussion of reports on:
"Tender Trucks" ..... 9:30 a.m. to 10:00 a.m.
"Fuel Economies" ..... 10:00 a.m. to 10:30 a.m.
"Lubricating Material Economies"... 10:30 a.m. to 11:00 a.m.
Individual paper:
"The Transfer of Heat." By Prof. Charles E. Lucke ..... 11:00 a.m. to 11:30 a.m.
Report on "Revision of Constitution and By-Laws" ..... 11:30 a.m. to 11:40 a.m.
Report on "Subjects" ..... 11:40 a.m. to 11:45 a.m.
Report on "Resolutions, Correspondence, etc." ..... 11:45 a.m. to 12:00 m.
Topical discussion:
(1).—"Is previous railway experience of advantage to locomotive firemen? If so, how may this be handled in a practical manner?" To be opened by D. R. MacBain, N. Y. C. & H. R..... 12:00 m. to 12:30 p.m.
(2).—"Brick arches and water tubes, their value and influence on fuel economy." To be opened by J. F. Walsh, Chesapeake & Ohio ..... 12:30 p.m. to 1:00 p.m.
Unfinished business:
Election of officers ..... } 1:00 p.m. to 1:30 p.m.
Closing exercises ..... }
Adjournment.

PROGRAM M. C. B. ASSOCIATION.

Opening Session.

Monday, June 21, 1909, 10:00 a.m. to 1:30 p.m.

Prayer ..... 10:00 a.m. to 10:05 a.m.
Address of president ..... 10:05 a.m. to 10:25 a.m.
Intermission ..... 10:25 a.m. to 10:30 a.m.
To permit visitors to retire.
Reports of secretary and treasurer.... 10:00 a.m. to 10:45 a.m.
Assessment and announcement of annual dues; appointment of committees on "Correspondence," "Resolutions," "Nominations," "Obituaries," etc. ..... 10:45 a.m. to 11:00 a.m.
Election of auditing committee..... 11:00 a.m. to 11:05 a.m.
Unfinished business ..... 11:05 a.m. to 11:10 a.m.
New business ..... 11:00 a.m. to 11:25 a.m.
Discussion of report on:
"Revision of Standards and Recommended Practice" ..... 11:25 a.m. to 12:00 m.
Topical discussions:
(1).—"Wheel Defects.—Is a brake burn due to prolonged brake application properly an owner's defect? How is it to be distinguished from the defect known as shelled out?" To be opened by H. D. Taylor..... 12:00 m. to 12:30 p.m.
(2).—"Application of suitable lugs to steel or steel underframe cars for jacking up car bodies, and application of suitable push-pole pockets to avoid damage to cars." To be opened by Thos. Paxton..... 12:30 p.m. to 1:00 p.m.
Discussion of reports on:
"Train Brake and Signal Equipment" ..... 1:00 p.m. to 1:15 p.m.
"Brake Shoe Tests" ..... 1:15 p.m. to 1:30 p.m.
Adjournment.

Middle Session.

Tuesday, June 22, 1909, 9:00 a.m. to 1:30 p.m.

Discussion of reports on:
"Tests of M. C. B. Coupler"..... 9:00 a.m. to 9:45 a.m.
"Revision of Rules for Loading Long Materials" ..... 9:45 a.m. to 10:00 a.m.
"Rules of Interchange," including report of "Arbitration" committee on "Revision of Freight and Passenger Car Rules"; also reports of committees on "Freight Car Repair Bills and Air-Brake Hose"..... 10:00 a.m. to 11:00 a.m.
"Cast-iron Wheels" ..... 11:00 a.m. to 12:00 m.
"Splicing Sills" ..... 12:00 m. to 12:15 p.m.
"Tank Cars" ..... 12:15 p.m. to 12:30 p.m.
"Safety Appliances" ..... 12:30 p.m. to 1:00 p.m.
"Side Bearings and Center Plates".. 1:00 p.m. to 1:30 p.m.
Adjournment.

Closing Session.

Wednesday, June 23, 1909, 9:00 a.m. to 1:30 p.m.

Discussion of reports on:
"Freight Car Trucks"..... 9:00 a.m. to 9:30 a.m.
"Painting Steel Cars" ..... 9:30 a.m. to 9:40 a.m.
"Side and End Door Fixtures"..... 9:40 a.m. to 10:00 a.m.
"Train Pipe and Connections for Steam Heat" ..... 10.00 a.m. to 10:10 a.m.
"Classes of Cars" ..... 10:00 a.m. to 10:30 a.m.
"Salt Water Drippings from Refrigerator Cars" ..... 10:30 a.m. to 10:45 a.m.
"Revision of Constitution and By-Laws" ..... 10:45 a.m. to 11:30 a.m.
"Subjects" ..... 11:30 a.m. to 11:45 a.m.
Unfinished business:
Reports of committees on "Correspondence," "Resolutions," and such other committees as may be named during the convention ..... 11:45 a.m. to 12:00 m.
Topical discussions:
(1).—"Wheel-mounting pressures for various sizes of cast-iron and steel wheels." to be opened by W. T. Gorrell..... .. ..
(2).—"Cleaning of triple valves and brake cylinders on freight cars to meet Interstate Commerce Commission requirements." To be opened by T. R. Burton ....
Election of officers ..... 1:00 p.m. to 1:30 p.m.
Adjournment.

MASTER MECHANICS' STANDING COMMITTEES.

Mechanical Stokers:
T. Rumney (Chairman), Erie, New York.
D. F. Crawford, Pennsylvania Lines, Pittsburgh, Pa.
C. E. Gossett, Iowa Central, Marshalltown, Iowa.
F. H. Clark, Chicago, Burlington & Quincy, Chicago.
Geo. Hodgins, 114 Liberty street, New York.

SPECIAL COMMITTEES.

1.—Revision of Standards:
W. H. V. Rosing (Chairman), Missouri Pacific, St. Louis, Mo.
T. W. Demarest, Pennsylvania Lines, Pittsburgh, Pa.
C. B. Young, Chicago, Burlington & Quincy, Chicago.
E. T. White, Baltimore & Ohio, Baltimore, Md.
G. W. Wildon, New York, New Haven & Hartford, New Haven, Conn.
2.—Motor Cars:
J. E. Muhlfeld (Chairman), Baltimore, Md.
R. N. Durborow, Pennsylvania, Altoona, Pa.
C. E. Fuller, Union Pacific, Omaha, Neb.
A. W. Horsey, Canadian Pacific, Montreal, Can.
J. H. Manning, Delaware & Hudson, Albany, N. Y.
3.—Castle Nuts:
R. B. Kendig (Chairman), Lake Shore & Michigan Southern, Cleveland, O.
J. F. De Voy, Chicago, Milwaukee & St. Paul, West Milwaukee, Wis.
G. S. Edmonds, Delaware & Hudson, Oneonta, N. Y.
J. N. Mowery, Lehigh Valley, South Bethlehem, Pa.
Jno. Player, American Locomotive Company, Dunkirk, N. Y.
W. L. Austin, Baldwin Locomotive Works, Philadelphia, Pa.

H. P. Meredith, Pennsylvania, Altoona, Pa.
4.—Safety Valves:
F. M. Gilbert (Chairman), New York Central & Hudson River, New York.
Jas. Milliken, Philadelphia, Baltimore & Washington, Wilmington, Del.
W. D. Robb, Grand Trunk, Montreal, Can.
M. H. Wickhorst, Chicago, Burlington & Quincy, Aurora, Ill.
J. G. Neuffer, Illinois Central, Chicago.
5.—Superheaters:
Le Grand Parish (Chairman), Lake Shore & Michigan Southern, Cleveland, Ohio.
Grant Hall, Canadian Pacific, Winnipeg, Man.
R. D. Hawkins, Great Northern, St. Paul, Minn.
W. F. Buck, Atchison, Topeka & Santa Fe, Chicago.
C. A. Seley, Chicago, Rock Island & Pacific, Chicago.
6.—Widening Gage on Curves:
F. M. Whyte (Chairman), New York Central Lines, New York.
W. H. Lewis, Norfolk & Western, Roanoke, Va.
F. C. Cleaver, Rutland, Rutland, Vt.
7.—Steel Tires:
A. W. Gibbs (Chairman), Pennsylvania Lines, Altoona, Pa.
A. Stewart, Southern, Washington, D. C.
Wm. Moir, Northern Pacific, St. Paul, Minn.
H. J. Small, Southern Pacific, San Francisco, Cal.
G. O. Hammond, Erie, Meadville, Pa.
8.—Tender Trucks:
H. T. Bentley (Chairman), Chicago & North Western, Chicago.
John Hair, Baltimore & Ohio Southwestern, Cincinnati, Ohio.
A. E. Manchester, Chicago, Milwaukee & St. Paul, West Milwaukee, Wis.
J. F. Walsh, Chesapeake & Ohio, Richmond, Va.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.
9.—Fuel Economies:
W. C. Hayes (Chairman), Erie, New York.
R. P. Sanderson, Virginian, Norfolk, Va.
D. R. MacBain, New York Central & Hudson River, Albany, N. Y.
T. B. Purves, Jr., Denver & Rio Grande, Denver, Colo.
W. H. Wilson, Buffalo, Rochester & Pittsburgh, Du Bois, Pa.
10.—Lubricating Material Economies:
T. S. Lloyd (Chairman), Delaware, Lackawanna & Western, Scranton, Pa.
E. D. Bronner, Michigan Central, Detroit, Mich.
E. F. Needham, Wabash, Springfield, Ill.
T. Roope, Chicago, Burlington & Quincy, Lincoln, Neb.
G. J. De Vibiss, Hocking Valley, Columbus, Ohio.
11.—Revision of Constitution and By-Laws:
D. F. Crawford (Chairman), Pennsylvania Lines, Pittsburgh, Pa.
F. H. Clark, Chicago, Burlington & Quincy, Chicago.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.
12.—Subjects:
Robert Quayle (Chairman), Chicago & North Western, Chicago.
Wm. McIntosh, Central Railroad of New Jersey, Jersey City, N. J.
P. Maher, Chicago & Alton, Bloomington, Ill.
13.—Arrangements:
H. H. Vaughan.

MASTER CAR BUILDERS' STANDING COMMITTEE.

Arbitration:
J. J. Hennessey (Chairman), Chicago, Milwaukee & St. Paul, W. Milwaukee, Wis.
J. E. Buker, Illinois Central.
E. D. Bronner, Michigan Central, Detroit, Mich.
T. W. Demarest, Pennsylvania Lines, Ft. Wayne, Ind.
W. A. Nettleton, Rock Island Lines, Chicago.
Standards and Recommended Practice:
T. S. Lloyd (Chairman), Delaware, Lackawanna & Western, Scranton, Pa.
J. E. Buker, Illinois Central, Chicago.
T. M. Ramsdell, Chesapeake & Ohio, Richmond, Va.
R. L. Kleine, Pennsylvania Lines, Altoona, Pa.
W. E. Dunham, Chicago & North Western, Winona, Minn.
Train Brake and Signal Equipment:
A. J. Cota (Chairman), Chicago, Burlington & Quincy, Chicago.
F. H. Scheffer, Nashville, Chattanooga & St. Louis, Nashville, Tenn.
R. K. Reading, Pennsylvania Lines, Buffalo, N. Y.
E. W. Pratt, Chicago & North Western, Missouri Valley, Iowa.
R. B. Kendig, Lake Shore & Michigan Southern, Cleveland, Ohio.
T. L. Burton, Central Railroad of New Jersey, Jersey City, N. J.
E. Posson, Atchison, Topeka & Santa Fe, Chicago.
Brake Shoe Tests:
W. F. M. Goss (Chairman), University of Illinois, Urbana, Ill.
D. B. Lockwood, Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind.
Wm. McIntosh, Central Railroad of New Jersey, Jersey City, N. J.
Coupler and Draft Equipment:
R. N. Durborrow (Chairman), Pennsylvania Lines, Altoona, Pa.
G. W. Wildin, New York, New Haven & Hartford, New Haven, Conn.
F. W. Brazier, New York Central & Hudson River, New York.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.
F. H. Stark, Pittsburgh Coal Co., Coraopolis, Pa.
Thos. Roope, Chicago, Burlington & Quincy, Lincoln, Neb.
G. W. Smith, Missouri Pacific, St. Louis, Mo.
Rules for Loading Materials:
A. Kearney (Chairman), Norfolk & Western, Roanoke, Va.
C. E. Fuller, Union Pacific, Omaha, Neb.
A. Stewart, Southern, Washington, D. C.
Wm. Moir, Northern Pacific, St. Paul, Minn.
J. S. Lentz, Lehigh Valley, S. Bethlehem, Pa.
W. F. Keisel, Jr., Pennsylvania Lines, Altoona, Pa.
L. H. Turner, Pittsburgh & Lake Erie, Pittsburgh, Pa.
Car Wheels:
Wm. Garstand (Chairman), Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind.
W. C. A. Henry, Pennsylvania Lines, Columbus, Ohio.
A. E. Manchester, Chicago, Milwaukee & St. Paul, W. Milwaukee, Wis.
W. E. Fowler, Canadian Pacific, Montreal, Can.
R. L. Ettenger, Southern, Washington, D. C.
R. F. McKenna, Delaware, Lackawanna & Western, Scranton, Pa.
O. C. Cromwell, Baltimore & Ohio, Baltimore, Md.
Safety Appliances:
C. A. Seley (Chairman), Chicago, Rock Island & Pacific, Chicago.
A. La Mar, Pennsylvania Lines, Ft. Wayne, Ind.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.
C. B. Young, Chicago, Burlington & Quincy, Chicago.
Le Grand Parish, Lake Shore & Michigan Southern, Cleveland, Ohio.
H. Bartlett, Boston & Maine, Boston, Mass.
T. M. Ramsdell, Chesapeake & Ohio, Richmond, Va.

SPECIAL COMMITTEES.

1.—Freight Car Trucks:
A. Stewart (Chairman), Southern, Washington, D. C.
J. J. Tatum, Baltimore & Ohio, Baltimore, Md.
A. S. Vogt, Pennsylvania Lines, Altoona, Pa.
J. F. De Voy, Chicago, Milwaukee & St. Paul, West Milwaukee, Wis.
G. A. Hancock, St. Louis & Santa Fe, Springfield, Mo.
2.—Splicing Sills:
R. E. Smith (Chairman), Atlantic Coast Lines, Wilmington, N. C.
W. F. Bentley, Baltimore & Ohio, Baltimore, Md.
H. L. Trimyer, Seaboard Air Lines, Portsmouth, Va.
I. S. Downing, Lake Shore & Michigan Southern, Collinwood, Ohio.
F. A. Torrey, Chicago, Burlington & Quincy, Chicago.
3.—Freight Car Repair Bills:
J. F. Deems (Chairman), New York Central Lines, New York.
J. E. Muhlfeld, Baltimore, Md.
D. F. Crawford, Pennsylvania Lines, Pittsburgh, Pa.
F. H. Clark, Chicago, Burlington & Quincy, Chicago.
J. G. Neuffer, Illinois Central, Chicago.
4.—Air-Brake Hose:
Le Grand Parish (Chairman), Lake Shore & Michigan Southern, Cleveland, Ohio.
Jas. Milliken, Philadelphia, Baltimore & Washington, Wilmington, Del.
R. W. Burnett, Canadian Pacific, Montreal, Can.
J. R. Onderdonk, Baltimore & Ohio, Baltimore, Md.
J. A. Carney, Chicago, Burlington & Quincy, West Burlington, Iowa.
5.—Side Bearings and Center Plates:
R. D. Smith (Chairman), Baltimore & Ohio, Boston, Mass.
R. P. C. Sanderson, Virginia, Norfolk, Va.
J. H. Manning, Delaware & Hudson, Albany, N. Y.
J. F. Walsh, Chesapeake & Ohio, Richmond, Va.
F. F. Gaines, Central of Georgia, Savannah, Ga.
C. A. Schroyer, Chicago & North Western, Chicago.

G. C. Bishop, Long Island, Richmond Hill, L. I.
6.—Painting Steel Cars:
G. E. Carson (Chairman), Bessemer & Lake Erie, Greenville, Pa.
T. Rumney, Erie, New York.
G. A. Schmoll, Baltimore & Ohio, Wheeling, W. Va.
J. M. Shackford, Delaware, Lackawanna & Western, Scranton, Pa.
J. T. Wallis, Pennsylvania Lines, Williamsport, Pa.
7.—Side and End Door Fixtures:
C. S. Morse (Chairman, Wheeling & Lake Erie, Toledo, Ohio.
J. A. McRae, Michigan Central, Detroit, Mich.
G. N. Dow, Lake Shore & Michigan Southern, Cleveland, Ohio.
C. F. Thiele, Pennsylvania Lines, Columbus, Ohio.
J. P. Young, Missouri Pacific, St. Louis, Mo.
8.—Tank Cars:
A. W. Gibbs (Chairman), Pennsylvania Lines, Altoona, Pa.
C. M. Bloxham, Union Tank Line, New York.
J. W. Fogg, M.M., Chicago Terminal Transfer, East Chicago, Ind.
Wm. McIntosh, Central Railroad of New Jersey, Jersey City, N. J.
S. K. Dickerson, Lake Shore & Michigan Southern, Cleveland, Ohio.
9.—Train Pipe and Connections for Steam Heat:
C. A. Schroyer (Chairman), Chicago & North Western, Chicago.
H. E. Passmore, Toledo & Ohio Central, Kenton, Ohio.
T. H. Russum, Baltimore & Ohio, Baltimore, Md.
T. H. Goodnow, Lake Shore & Michigan Southern, Chicago.
J. J. Ewing, Chesapeake & Ohio, Richmond, Va.
10.—Classes of Cars:
D. F. Crawford (Chairman), Pennsylvania Lines West, Pittsburgh, Pa.
C. B. Young, Chicago, Burlington & Quincy, Chicago.
H. Bartlett, Boston & Maine, Boston, Mass.
H. H. Carson, Pennsylvania Lines, Philadelphia, Pa.
F. M. Whyte, New York Central, New York.
11.—Salt Water Drippings from Refrigerator Cars:
M. K. Barnum (Chairman), Chicago, Burlington & Quincy, Chicago.
G. W. Lillie, St. Louis & Santa Fe, Springfield, Mo.
W. E. Sharp, Armour & Company, Chicago.
E. W. Pratt, Chicago & North Western, Missouri Valley, Iowa.
P. Maher, Chicago & Alton, Bloomington, Ill.
D. C. Ross, Michigan Central, Detroit, Mich.
W. C. Arp, Vandalia, Terre Haute, Ind.
12.—Revision of Constitution and By-Laws:
D. F. Crawford (Chairman), Pennsylvania Lines, Pittsburgh, Pa.
F. H. Clark, Chicago, Burlington & Quincy, Chicago.
T. H. Curtis, Louisville & Nashville, Louisville, Ky.
13.—Subjects:
H. D. Taylor (Chairman), Philadelphia & Reading, Reading, Pa.
A. W. Gibbs, Pennsylvania Lines, Altoona, Pa.
J. S. Lentz, Lehigh Valley, South Bethlehem, Pa.
14.—Arrangements:
R. F. McKenna, Delaware, Lackawanna & Western, Scranton, Pa.

THE BIGGEST RAILWAY MAP.

A map of mammoth proportions showing the rich territory through which run the lines of the Chicago, Milwaukee & St. Paul and the Chicago, Milwaukee & Puget Sound railways is to be one of the notable exhibits at the American Manufacturers' Exhibition in London this summer. It is said to be the largest map of the kind ever made in America.

The map itself is 30 ft. long and 8 ft. high, but with its frame and accompanying transparencies it is 47 ft. long 21 ft. 6 in. high. The upper portion of the United States and the bordering territory of the Dominion of Canada are shown on a scale of 122 miles to the foot. In the lower right corner is an inset showing England and Wales on the same scale, the whole inset being about the size of the state of Wyoming.

Officials of the Chicago, Milwaukee & St. Paul are being congratulated upon the enterprise they have shown in having such a splendid exhibit sent abroad. Accompanying it are transparencies showing scenes abcard C., M. & St. P. trains and scenery along the route. The map itself is likewise illuminated.

COMMITTEES OF THE RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.

While the Executive Committee directs the affairs of the Railway Supply Manufacturers' Association, it relies largely on the several committees for carrying its plans to a successful issue. Under the present organization the chairmen are appointed by the association, and the chairmen select their assistants.

The committees in charge of the 1909 convention are as follows:

ENTERTAINMENT COMMITTEE.

Charles P. Storrs, Storrs Mica Company, Chairman; E. H. Walker, Standard Coupler Company; J. Will Johnson, Pyle-National Electric Headlight Company; S. W. Midgley, Curtain Supply Company; Bertram Berry, Heywood Bros. & Wakefield Co.; Ross F. Hayes, Curtain Supply Company; C. M. Garrett, Farlow Draft Gear Company; J. L. Connors, Ralston Steel Car Company; W. J. Walsh, Galena-Signal Oil Company; H. E. Oesterreich, Wendell & MacDuffie; Philip J. Mitchell, Philip S. Justice & Company; Leonard J. Hibbard, L. J. Hibbard Company; J. C. Younglove, H. W. Johns-Manville Company; Clayton W. Old, American Blower Company; John M. Stayman, Gold Car Heating & Lighting Company; J. S. Seabury, Massachusetts Mohair Plush Company; T. C. DeRosset, The T. H. Symington Company; E. S. Toothe, Nathan Manufacturing Company; Frank Martin, Jenkins Brothers; Thomas Farmer, Jr., Consolidated Car Heating Company; G. L. Walters, Adams & Westlake Company; George Groobey, Buckeye Steel Castings Company; Charles P. Williams, Chicago Railway Equipment Company; A. S. Blanchard, Atha Steel Castings Company; Charles A. Knill, Charles H. Besley & Company; F. B. Ernst, American Steel Foundries; C. A. Dunkelberg, S. F. Bowser & Company, and E. E. Silk, Bettendorf Axle Company.

Charles P. Storrs, Chairman.

Unlike the other committees whose work is more uniform, the Entertainment Committee is divided into several sub-committees. By this scheme each knows his duties and there is no confusion or waste of time. The sub-committees for this year are:

Door.—Messrs. Hayes (chairman), Stayman, Hibbard, Knill, Martin, Williams, Walters and Ernst.

Introduction.—Walsh (chairman), Garrett, Connors, Mitchell, Old, Groobey, Blanchard and Dunkelberg.

Informal Dance.—Oesterreich (chairman), Seabury, Knill, Younglove, Farmer and Blanchard.

Ushers.—Younglove (chairman), Stayman, Seabury, Toothe, Walters, Groobey and Blanchard.

Marshals.—DeRosset (chairman), Walker, Johnson, Midgley, Connors, Mitchell, Old, Farmer and Walters.

Master Mechanics' Reception.—Mitchell (chairman), Walker, Walsh, Hibbard, De Rosset, Knill and Martin.

Master Mechanics' Ball.—Johnson (chairman), Oesterreich, Stayman, Mitchell, Knill, Younglove, Toothe and Walters.

Master Car Builders' Reception.—Garrett (chairman), Hayes, Stayman, De Rosset, Old, Farmer and Groobey.

Master Car Builders' Ball.—Walker (chairman), Midgley, Berry, Garrett, Hibbard, Seabury, De Rosset and Williams.

Special Stunts.—Connors (chairman), Garrett, Walsh, Oesterreich, Toothe, Farmer, Stayman, De Rosset and Old.

Music.—Old (chairman), Johnson, Hayes, Seabury, De Rosset, Younglove and Blanchard.

Baseball.—Hibbard (chairman), Connors, Walsh, Williams, Martin, Midgley and Ernst.

Afternoon Entertainments.—Midgley (chairman), Berry, Hayes, Oesterreich, Martin, Walters, Groobey and Dunkelberg.

Euchre Party.—Berry (chairman), Johnson, Hayes, Walsh, Mitchell, Younglove, Walters and Dunkelberg.

TRANSPORTATION COMMITTEE.

Harry Quest, John Lucas & Company, chairman; L. C. Brown, Ralston Steel Car Company; Joseph H. Kuhns, Republic Rubber Company; C. O. Taylor, Ball Chemical Company; Joseph M. Brown, Peter Gray & Sons; W. R. Parker, John Lucas & Company; W. J. Caton, Thomas E. Coale Lumber Company; Frank M. Grigg, Adams & Westlake Company; W. H. Coyle, Franklin Railway Supply Company; P. H. Ferguson, Seamless Tube Company of America; E. B. Van Patten, Murphy Varnish Company; William J. Cromie, Clement-Restein Company; John D. McClintock, William Sellers & Company, Incorp.; Edwin F. Leigh, Chicago Railway Equipment Company; Henry C. Brown, National Tube Company; A. L. Kendall, W. P. Taylor & Company; F. W. Edwards, Ohio Injector Company, and G. S. Stuart, Franklin Manufacturing Company.

Harry Quest, Chairman.

ENROLLMENT COMMITTEE.

W. W. Rosser, The T. H. Symington Company, chairman; Kelly R. Johnston, National Malleable Castings Company; Chas. J. Symington, The T. H. Symington Company; Oscar F. Ostby, Commercial Acetylene Company; J. G. Mowry, Patton Paint Company; R. B. Clark, Jr., Scullin-Gallagher Iron & Steel Company; C. C. Higgins, American Brake Shoe & Foundry Company; A. E. Hooven, Railway & Engineering Review; Wm. S. Hammond, Jr., Consolidated Car Heating Company; Wm. A. Polk, Patterson-Sergeant Company; R. B. Fuller, Carborundum Company; J. W. Dalman, American Steel Foundries; C. H. Peterson, Baldwin Locomotive Works and S. R. Fuller, Jr., Gould Coupler Company.

W. W. Rosser, Chairman.

FINANCE AND EXHIBIT COMMITTEES.

These two committees are in reality subdivisions of the Executive Committee. S. P. Bush, Buckeye Steel Castings Company, is chairman of the Finance Committee, and Thomas Aldcorn, Chicago Pneumatic Tool Company, is chairman of the Exhibit Committee. The pictures of both appear on another page as members of the Executive Committee.

COMMITTEE OF ARRANGEMENTS.

This committee, otherwise known as the Committee on Grouches, will undertake to adjust all complaints upon notice thereof. The members are H. H. Vaughan, President American Railway Master Mechanics' Association; R. F. McKenna, President Master Car Builders' Association; and Alex. Turner, chairman, President Railway Supply Manufacturers' Association. The chairman can be found at the office of the Railway Supply Manufacturers' Association at the left of the main entrance, Entrance Hall, Young's New Million Dollar Pier.

PAST PRESIDENTS OF THE MASTER MECHANICS' ASSOCIATION.

H. M. BRITTON	1868-1876	Deceased
N. E. CHAPMAN	1876-1880	Deceased
J. N. LAUDER	1880-1882	Deceased
REUBEN WELLS	1882-1884	
JOHN H. FLYNN	1884-1885	Deceased
J. DAVIS BARNETT	1884-1885	Acting President
J. DAVIS BARNETT	1885-1886	
WILLIAM WOODCOCK	1886-1887	Deceased
JACOB JOHANN	1886-1887	Acting President
J. H. SETCHEL	1887-1889	
R. H. BRIGGS	1889-1890	
JOHN MACKENZIE	1890-1892	
JOHN HICKEY	1892-1894	
W. GARSTANG	1894-1895	
R. C. BLACKALL	1895-1896	Deceased
R. H. SOULE	1896-1897	
PULASKI LEEDS	1897-1898	Deceased
ROBERT QUAYLE	1898-1899	
J. H. MCCONNELL	1899-1900	
W. S. MORRIS	1900-1901	
A. M. WAITT	1901-1902	
G. W. WEST	1902-1903	
W. H. LEWIS	1903-1904	
P. H. PECK	1904-1905	
H. F. BALL	1905-1906	
J. F. DEEMS	1906-1907	
WM. MCINTOSH	1907-1908	

Regular visitors will recall the interest manifested in the Kewanee union, which has always been a prominent feature in the exhibit of the National Tube Company, Pittsburgh, Pa., at previous conventions. Mechanical men in general are well acquainted with the advantages of this union with no inserted parts. The casual visitor may not, however, be conversant with the variety of specialties which embody the Kewanee principle. It should therefore be interesting to the many who now use, or contemplate using, this union, to visit the National Tube Company's booth 28, where samples of numerous Kewanee specialties are shown, including various patterns of the Kewanee union, embracing octagon, round end or regular; hexagon and male and female patterns; Kewanee union ells and tees; boiler couplings; circulating boiler fittings (ells and couplings); the Kewanee eccentric, hose, air drill and air pump; extra heavy and hydraulic unions; Kewanee union valves, also swing-check and radiator valves; Kewanee union cocks and flange unions. Each specialty is made on the Kewanee principle, which embraces the following basic principles:

(1) Brass to iron thread connection, which prevents corrosion, thus making a joint which can be readily disconnected and reconnected, even after years of service.

(2) Brass to iron ball joint seat, which makes an air tight seal without a gasket.

(3) The rigid test applied to each and every Kewanee specialty 100 lbs. compressed air under water, insuring sound castings and perfect fittings.

Conventionalities

The sessions of the convention will be held, as was done last year, in the Greek Temple on the Million-Dollar Pier.

The Marlborough-Blenheim hotel has been selected as headquarters for both associations. The president, executive committee and secretary will have offices there.

The enrolment committee will be located in the entrance to the pier. Each member of each association, immediately upon arrival, should go to the enrolment booth, register and receive his membership button, if he has none, and be furnished a properly numbered celluloid disk showing his registration. Members will also be furnished with badges for their families. Cards for registration will b furnished at the enrolment booth at the entrance to the pier.

Those who expect to attend both the M. M. and M. C. B. conventions should register twice, once for each convention, in order that a proper record may be kept of those present at each convention.

The editor apologizes for the absence of the customary editorial on the weather. This year there has been no weather.

L. F. Hamilton, manager of the publicity and specialty departments of the National Tube Company, arrived Monday, and is stopping at the Marlborough-Blenheim.

Anyone who thinks that these happy-handed supply men do not know what it is to work in connection with a convention should have been on the pier Monday and Tuesday.

As usual, J. F. Walsh, superintendent of motive power of the Chesapeake & Ohio, was one of the early arrivals. He got here Monday and is accompanied by Mrs. Walsh and Miss Walsh.

. The Pantasote Company denies that the horseshoe crabs in the aquarium at the end of the ballroom have shells made of Agasote. They say that if it were Agasote it wouldn't collect barnacles.

Mr. Haller, of the American Locomotive Company, says that he intended to bring a life-size locomotive and steam shovel with him, but decided not to, since the pier is not quite high enough.

Some people think Whip looks glum; but as the odds at present writing are even—the convention's only just begun—he ought to cheer up and —— apply to Rosser, who's in charge of the cage.

O. C. Gayley, Second Vice-President, and C. E. Portlethwaite, Manager of Sales, central district, the Pressed Steel Car Company, are at the Marlborough-Blenheim, being among the first to arrive at the convention, as usual.

Henry J. Bellman, who has represented the American Hair Felt Company for many years, will this year make his headquarters at the H. W. Johns-Manville booth, No. 492, as this company is now handling the product of the Felt Company.

A station of the Atlantic City Postoffice is located on the pier in the Entrance Hall, adjoining the enrolment booth. Mail addressed to members and guests in care of the Railway Supply Manufacturers' Association may be called for at this station.

"Staf" was on the job early. He feels his importance immensely since his appointment as a member of the Executive Committee, but the goblers 'll catch him if he don't watch out. There's an executive committee election on Saturday—and B. E. D. S. (note the tired feeling)—is up.

Rosser is the official bird tamer. He spent most of Monday forenoon arranging plumage. From the picture he presented while in action we should say that his greatest difficulty was in inducing them to stay on their perches. For full particulars, however, we refer you to the enrolment booth.

G. S. Allen, who was elected honorary member of the Master Mechanics' Association last year, is attending the convention, accompanied by his daughter, Mrs. Kase. Mr. Allen was located at Tamaqua, Pa., for 52 years in the service of the P. & R. Railway. His son, C. W. Allen, is Vice-President of the L. J. Bordo Company, of Philadelphia.

H. M. Perry is one of the oldest members of the Master Car Builders' Association and has been one of the most constant in attendance since its organization. The fact that he is especially interested in side-bearings does not detract greatly from his interest in other subjects and he is early on the ground in time for both conventions.

At the reception to be given by the president and officers of the Master Mechanics' Association on Wednesday evening, June 16, at the Marlborough-Blenheim, John Barnes Wells, of New York, the well-known tenor, will sing. Mr. Wells will be remembered by many who heard him at the Sunday concerts during the convention of last year.

Last year it was Artie and Earl—and they were whales. This year two of 'em are Alec and Earl—and they're seals. It would appear from this that Earl was a whale and now is is a seal; but he tells us that the noises he has heard continually ever since the supply of fraternity began to point toward Atlantic City make him feel like a wail.

Some inquiring mind has prompted a question as to what is the matter with the big electric sign which announces the location of "Young's Million-Dollar Pier." The letters are leaning away from all the winds of heaven, and some of those that come from the land, which seem nearly the opposite—sometimes. The explanation most in favor is that the music of the band went through the roof.

"Moxie" Ross, who with the able assistance of Mrs. Ross, has done so much in arranging entertainment for attendants upon these conventions, arrived on Monday. Mark exerts so much influence throughout the year in diffusing light through dark places for the benefit of railway men through the instrumentality of the Pyle-National electric headlight that he feels justified in leaving his lamps at home and therefore has no exhibit.

The Western Union Telegraph Co. will have an office in the Marlborough-Blenheim Hotel, and the Postal Telegraph Co.'s office is at Michigan and Pacific avenues. Messengers may be called by telephone by members and exhibitors on the pier.

A Bell telephone has been placed between each two exhibit booths on the pier. These are available for free local service for exhibitors. They will be equipped with automatic coin devices for long distance calls.

We purposely omitted one added attraction to this year's collection of exhibits in our comment in the Exhibitors and Others column. We refer to Mrs. Clark Fisher, owner of the Eagle Anvil Works (Fisher & Norris), Trenton, N. J. It is some years since these conventions have been graced by a real live business woman as an exhibitor. Mrs. Fisher reached Atlantic City Monday afternoon in her automobile and met with no accident more serious than turning a wrong corner when within one block of the New Pier.

C. H. Everett, who has been the representative of the Dearborn Drug & Chemical Works in the Birmingham, Ala., territory for the past seven years, expected to attend the conventions this year for the first time. Unfortunately he met with a severe accident at Atlanta just before leaving for Atlantic City and will not therefore be able to be with us. Master Mechanics Fetner, Boldridge and Gross, of the Central of Georgia Railroad, friends of the injured man, called on him just before leaving for Atlantic City and reported on their

arrival yesterday that Mr. Everett was making satisfactory progress towards recovery.

A special car containing a large number of the Cleveland contingent, under the auspices of the National Malleable Castings Co., arrived Tuesday morning. Among those on board were S. L. Smith, W. E. Coffin, J. H. Jaschka, R. T. Hatch, G. V. Martin, C. A. Bilder, Benj. Nields, Jr., L. S. Wright, H. D. Hammond, E. O. Warner, R. H. Nilson, all of the National Malleable Castings Company; Albert Waycott and Phil Handiges of the Damascus Brake Beam Company; J. R. Blakeslee, of the Ajax Manufacturing Company; J. F. Janes, of the Talmage Manufacturing Company; and E. M. Williams, of the Sherwin-Williams Company.

Indicative of either the youth or the vitality of the timber from which the Master Mechanics' Association makes its presidents is the list of past presidents which the secretary publishes as a part of the official program. The list now covers from 1868 to 1908 and contains 26 names. Of these, up to the time of the publication of the list, all but seven were living. Since publication two have died—Richard H. Soule and George W. West—both men who have left a record in railway mechanical affairs worthy of emulation by their successors. Reverting to the question of youth or vitality, it may be remarked that neither Reuben Wells nor J. H. Setchell, nor R. H. Briggs, nor W. H. Lewis are exactly chickens. In the case of Messrs. Setchell and Wells, it may be suggested that perhaps some part of their continued vitality is due to the fact that it is more conducive to longevity to build locomotives than to operate and repair them; but when we come to "Billy" Lewis, that argument fails. The rest of them, since the time of John Mackenzie, may still be classed among the young fellows.

It is always a matter of wonderment, even to the oldest and most constant of convention attendants, to note the change that one day makes in the general appearance of the exhibit space. To the uninitiated it would have appeared on Monday morning that a couple of weeks would be about the time required to get everything into even the semblance of order. On Tuesday morning this estimate would be shortened by possibly a week, but that anything like order could be evolved out of the semi-chaos by Wednesday he would pronounce miraculous. And yet, as a matter of fact, the people who are doing things here are so accustomed to achieve the impossible that it is safe to say that, with some few exceptions, the exhibits will be in presentable shape shortly after this paper reaches its earliest readers and before noon will present the aspect of having been installed as a permanency. The notion of working up to a definite schedule appears to have permeated the atmosphere—not only that in which the railway officers work, but that in which the supply men live, move and have their being. It's all in the game and the winner is the one who observes its rules. The man from St. Louis who wired for exhibit space last Saturday didn't know the rudiments of it.

When the foxy S. M. P-ter,
Driver of the iron horses,
Doctor of the iron horses,
Masseur of the heart, the firebox,
Purger of the tubes, abdomen,
Surgeon of the throat, the smokestack,
Specialist in things, the smokebox,
Hastener of circulation,
Foe to scale, tuberculosis,
Foe to soot, an indigestion,
Foe to smoke, a tainted breathing,
Showing stomach, tubes and firebox
Out of order, badly nourished—

Found that all his skill and labor—
Skill in driving, feeding, grooming,
Labor as a careful surgeon,
Doctor, specialist, pill-shooter—
Didn't make the patient better,
Brought no signs of great improvement,
Found, on thorough diagnosis,
Found, on yearly consultations,
Circulation weak and sluggish,
Smokestackemia, fireboxitis,
Scalorrhoea and coalomania—
Said unto himself in this wise,
Just about in this wise talked he:

"I will get," said S. M. P-ter—
Doctor of the iron horses,
Horses, eaters of the coal-pile,
Horses, spavined, broken-winded,
Tied up in the stalls, the roundhouse,
In the hands of "vets," the back-shop—
"I will get some hobby-horses,
Hobby-horses eating juicelets,
String them up to wires of copper,
Rock them on a fence of copper,
Make the juicelets in the stable,
In the stable, central station,
Squirt the juice to their interiors;
Then I'll sell the iron horses,
Send them to the pasture, bone yard;
Then I'll drive my hobby-horses."
Said G. M. to S. M. P-ter,
Said the great Moguls of Wall street,
Owners of the iron horses,
Owners of the "stock" in question—
"You may ride your hobby-horses,
You may say in consultation,
Horses eating coal are nowhere,
Horses eating coal are costly—
But we own the iron horses
And we shall not build the stables,
Stables where to make your juicelets,
Nor the fence nor strings of copper.
But we'll keep the iron horses,
You shall feed and groom the horses,
Drive and feed and *groom the horses*,
But may sometimes ride your hobby."

PENNSYLVANIA SPECIAL TRAIN.

The Master Mechanics' and Master Car Builders' special train run by the Pennsylvania from Chicago to Atlantic City ran as a second section to the Pennsylvania Limited. It left Chicago at 5.30 p. m. Monday and arrived at Atlantic City on schedule time at 4.45 p. m. Tuesday. The train consisted of 12 cars, as follows: One composite car, two dining cars, seven 12-section drawing-room sleeping cars, one 10-stateroom compartment car and one 6-stateroom observation car. The train was electrically lighted from a dynamo in the composite car. George Beltzhoover, City Passenger Agent of the Pennsylvania Railroad at Chicago, was in charge of the party. Among those on board were the following: John Tonge, Master Mechanic and Master Car Builder of the Minneapolis & St. Louis; A. E. Manchester, Superintendent Motive Power, Chicago, Milwaukee & St. Paul; J. F. De Voy, Mechanical Engineer, Chicago, Milwaukee & St. Paul; C. E. Fuller, Superintendent Motive Power and Machinery, Union Pacific; C. A. Seley, Mechanical Engineer, Chicago, Rock Island & Pacific; E. B. Thompson, Superintendent Motive Power and Machinery, Chicago, St. Paul, Minneapolis & Omaha; W. Moir, Mechanical Superintendent, Northern Pacific; A. C. Hinckley, Master Mechanic, Cincinnati, Hamilton & Dayton; H. C. Van Buskirk, Superintendent Motive Power, Car Department, Colorado & Southern; F. E. Davisson, Superintendent Machinery, San Pedro, Los Angeles & Salt Lake; W. L. Allison, Mechan-

ical Engineer, Atchison, Topeka & Santa Fe; J. T. Flavin, Master Mechanic, Chicago, Indiana & Southern; M. J. Drury, Mechanical Superintendent, Atchison, Topeka & Santa Fe; W. L. Kellogg, Master Mechanic, Pere Marquette; J. W. Fogg, Master Mechanic, Chicago Terminal Transfer; P. H. Peck, Chicago & Western Indiana; C. W. Seddon, Superintendent Motive Power, Duluth, Missabe & Northern; G. W. Seidel, Superintendent of Shops, Chicago, Rock Island & Pacific; T. G. Windes, Kennicott Water Softener Co.; Frank W. Furry, Ohio Injector Co.; W. S. Bartholomew and C. C. Farmer, Westinghouse Air Brake Co.; E. T. Hemdee, Joseph T. Ryerson & Son; R. H. Ripley, American Steel Foundries; M. A. Garrett, Farlow Draft Gear Co.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.

The Railway Supply Manufacturers' Association announces through its secretary, Earl G. Smith, that the district meetings for the election of members to fill vacancies in the executive committee will be held in the Convention Hall, Million Dollar Pier, on Friday, June 18, as follows:

First District—New England states, 2:30 p. m.

Second District—New York and New Jersey, 3.00 p. m.

Third District—Pennsylvania, Delaware, District of Columbia and West Virginia, 3:30 p. m.

Fourth District—Ohio, Indiana, Michigan, Kentucky and Tennessee, 4:00 p. m.

Seventh District—States west of Mississippi valley, including Louisiana and excepting Iowa and Minnesota, 4:30 p. m.

One member is to be elected from each district.

J. A. Kinkead, Manager of Sales of the Parkesburg Iron Co., and a party of friends, rode to Atlantic City from New York in one of the company's automobiles, reaching here Tuesday. John R. Huntton, Assistant General Manager, and George Thomas, third Treasurer of the company, arrived from Parkesburg, Pa., Tuesday night in Mr. Huntton's machine.

THE FRANK THOMSON SCHOLARSHIPS.

Special efforts are to be made this year by the Pennsylvania Railroad to induce the largest possible number of the sons of its 175,000 employees to participate in the competitive examinations to be held in June for Frank Thomson Scholarships. These provide an income of $600 a year for four years for each of the successful candidates, enabling them to take a full course at any of the leading colleges of the country.

The Thomson Scholarships, two of which are awarded every year, were established in 1907 by the children of the late Frank Thomson, President of the Pennsylvania Railroad Company, as a memorial to their father. They are endowed in the sum of $120,000, and are designed to afford to the sons of both living and deceased employees an opportunity to qualify themselves for employment by the company. Four scholarships have been awarded in the past two years. One of the successful contestants is at Yale University, another is at the University of Michigan, and two are at the University of Pennsylvania.

The examinations this year will be held under the direction of the College Entrance Examination Board of New York City. They will be open to the sons of the employees of all the lines of the Pennsylvania System, including the Erie & Western Transportation Company, Cumberland Valley Railroad, Long Island Railroad, Grand Rapids & Indiana Railway, Vandalia Railroad, Cincinnati & Muskingum Valley, Cleveland, Akron & Columbus Railway, Cincinnati, Lebanon & Northern Railway, Wheeling Terminal Company, and Waynesburg & Washington Railroad.

With Exhibitors and Others.

There is always something to be said in praise of the exhibition of railway appliances when compared with the June previous and 1909 is no exception. The noticeable improvements are a decidedly more beautiful Entrance Hall and a reduction of the entire display to practically one floor level. Last year the upper part of Marine Hall, designated officially "Exhibition Hall" to distinguish it from Amusement Hall (the floor below) was utilized. This has been turned into a Hippodrome in which band concerts are given; and Amusement Hall is now Exhibition Hall. Machinery Hall looks better than in 1908, due largely to a uniformly low booth construction. The tall columns of a year ago were dispensed with.

In size also this year's display is a record breaker. The exhibits on Million Dollar Pier occupy 65,476 sq. ft.—7,676 sq. ft. more than in 1908. The track exhibits which, like last year, are located on the tracks of the Philadelphia & Reading Railway are more in number than in June last.

* * *

The 1¼-in. and 1¼-in. Keystone connecting links that the Keystone Drop Forge Works, Chester, Pa., is making fully meet the demands of the heavier wrecking chain now in use. Don't fail to see these two new sizes at space No. 375.

* * *

Greene, Tweed & Co., New York, are exhibiting in space No. 43 their Palmetto packings, which are adopted as standard for air pump and throttle valve service on most of the railways of this country. For air pump and throttle service the Palmetto packing is cut up in the form of sets ready to apply. For globe and other small valves they furnish Palmetto twist packing on 1-lb. spools, which can be unstranded and used for any size valve. They are also exhibiting the Favorite reversible ratchet wrench, which has won its way into favor in railway shops by reason of the fact that it can be used to advantage in very cramped spaces where the use of the ordinary wrench is not possible. F. E. Ransley and B. M. Bulkley are at hand in the booth. It is with great regret that H. S. Demarest, the Sales Manager of the concern, is compelled to be in Europe on business and cannot attend this convention.

* * *

Signal cord is a small item with a railway, but it is worthy of attention because it is needed badly when it is needed; a broken cord is liable to cause a good deal of trouble. There are a number of cheap brands on the market which may cost less in the first place, but which are a sure cause of annoyance and expense in the end. These cords are made of coarse yarn, braided roughly and softly, and finished poorly. They stretch badly and wear out quickly by abrasion in running over the supports. It is worth while to pay a little more and get cord on which one can rely. The Samson brand, made by the Samson Cordage Works, Boston, Mass., is extra quality and will wear many times longer than cheap brands. It is made of fine yarn, braided hard and smooth, and guaranteed to be free from all imperfections of braid or finish. It is made in all sizes and colors, and can be furnished with a wire center if desired. The manufacturers are glad to send samples, and one only needs to compare them with other brands to see the difference and understand the superior durability and economy of the Samson cord.

* * *

The American Nut & Bolt Fastener Co., Pittsburgh, Pa., extends invitation to all to visit its display of Bartley fasteners at Exhibit Space No. 330.

The Chicago Railway Equipment Co. has been making some interesting experiments with new high speed brake beams and adjustable brake heads during the past year. The results of this investigation and study are well shown at its exhibit space 546 to 551 inclusive. The large laboratory at the new plant of the company in Chicago has been especially designed and equipped for such tests and experiments. These excellent facilities are at the disposal of any railway officer desiring to investigate brake-beam conditions and structures of any kind.

* * *

The exhibit of the Hunt-Spiller Manufacturing Corporation, Boston, Mass., at space 469 in the annex, is more interesting than ever, and the reception space looks comfortable and inviting. If appearances count for anything, the Hunt-Spiller people must have been doing a good business during the hard times. Gordon Dexter, of Boston, the secretary of the corporation, is in attendance, this being his first convention. W. B. Leach, the general manager, is here, as usual, as is also J. G. Platt, the mechanical representative.

* * *

The Davis-Bournonville Co., New York, has two exhibits of oxy-acetylene welding, one at the booth of the Commercial Acetylene Co., New York, space 201-209, where samples of work and apparatus are shown. The other exhibit is at a special booth at the rear of the Greek Temple, where practical working demonstrations are made. Among the exhibits are cast iron cylinders, aluminum work, a locomotive frame, brass, copper, steel and German silver welded in one piece, and many other welds of equal interest. A steel car-bolster will be welded at the demonstration booth. There will be a complete display of the various torches, gages and controlling devices, as well as acetylene and oxygen generating plants.

* * *

The Asbestos Protected Metal Co., Canton, Mass., is this year at space 353. The exhibition should prove very interesting to the mechanical men, demonstrating, as it does, a material which has proved its worth in the covering of various railway buildings, such as coal tipples, roundhouses, freight sheds, storage buildings and other structures where liability of fire and severe attack of sulphurous gases are to be met.

* * *

The Parkesburg Iron Co., Parkesburg, Pa., is holding forth at the same old stand of last year. The booth number is 388 this time, an advance of two numbers in a year.

* * *

The advantage of using a specially constructed hose for conveying either hot or cold water between the engine and tender is apparent to all mechanical men. To meet this demand the Boston Belting Co., Boston, Mass., offers its Eureka engine and tender connection hose. This hose is made any size or length, either straight or curved. It has a corrugated exterior and there is a wire in the walls of the hose which prevents it from kinking or collapsing. The quality of material used is said to be such as to ensure proper durability and it is claimed that Eureka engine and tender connection hose has proved exceptionally satisfactory to many of the leading railway systems which are familiar with its merits.

* * *

The Joseph Dixon Crucible Co., Jersey City, N. J., has two pictures on exhibition at its stand which show, in a remarkably striking way, how to do and how not to do it. One shows the end of a car painted with common red paint, after 18 months of service. The other shows the surface of a car painted with the Dixon silica-graphite paint after the same term of service. The difference is great and preaches a whole sermon in the advocacy of the use of good materials.

* * *

The McConway & Torley Co., Pittsburgh, Pa., the pioneer manufacturer of the M. C. B. type of coupler, has in its exhibit, spaces 415-419, a sample of the Pitt and Janney "X" freight couplers, Janney passenger coupler, Buhoup 3-stem coupler and Janney "X" tender coupler. The Janney "X" freight coupler is the latest development of the M. C. B. type of coupler manufactured by his firm. This coupler retains the simplicity of the original Janney coupler with a vertical locking pin, and has the up-to-date features of a lock-to-the-lock, lock-set, and a knuckle-opener, fully meeting not only the requirements, but all the recommendations of the M. C. B. Association. It is also showing the Pitt freight coupler with both the underneath uncoupling and also the side uncoupling arrangement, and a new type of Janney passenger coupler with knuckle-opener.

* * *

The Wells Light Manufacturing Co., Jersey City, N. J., is preparing a new catalogue showing changes in prices and a few alterations which should be interesting to those acquainted with its products. The new No. 7 burner is a special feature. For heating only, the burner emits a pure, blue flame, so there is no waste of fuel. The principle is the same as that of the Wells light, but by an adjustment of the burner, and a slight change in its construction, the result is heat instead of light. The company claims the outfit to be the most effective and least costly of its kind, both in first and running cost. It is especially suitable for straightening bent locomotive frames, boiler making and repairing, saves the time of building up an arch or forge and changes the old system of taking the work to the heat, by taking the heat to the work. When not in use for heating, the simple exchange of a lighting burner turns the outfit into a regular Wells light, and if the hose is used, the light becomes independent of the tank, according to the length of hose in use. The company is prepared to prove its assertions through the medium of a practical trial at its expense.

* * *

The Mason Regulator Co., Boston, Mass., which is one of the oldest exhibitors of the convention, will this year occupy Space No. 17 in the ball-room. It will exhibit, among other steam specialties, the new locomotive reducing valve for use in heating systems on railway trains. This new valve has been designed after months of experiments and tests to meet the demand for a light, compact, reliable steam heating valve that will not chatter or stick.

* * *

The Carborundum Company, Niagara Falls, N. Y., is known throughout the railway world as the manufacturer of Carborundum, claimed to be the hardest, sharpest and fastest cutting abrasive the world has ever known. In its Atlantic City exhibit, the company will show a full line of Carborundum grinding wheels for all kinds of tool grinding, twist drill, reamer, link and guide bar grinding; Carborundum sharpening stones for bench work; Carborundum rubbing bricks; Carborundum paper and cloth for general shop work and garnet paper for car repairers and builders, and Carborundum valve grinding compound for all kinds of valve grinding where a perfect contact seat is required. Carborundum wheels and sharpening stones are so well known among the railway men that but little comment need be made here regarding them. The garnet paper manufactured by the Carborundum Company has taken its place among all the high class papers of this nature. It is especially recommended to car builders and repairers and for all kinds of fine wood and cabinet work in car interiors. The Carborundum valve grinding compound is an entirely new product and will be shown for the first time at the Atlantic City conventions. Carborundum valve grinding compound consists of Carborundum grains mixed with a high grade grease. There are two grades of compound, one coarse and the other fine, put up in 1, 3 and 5-lb. tins. Railway men, it is claimed, will find that Carborundum valve grinding compound is absolutely without an equal. It gives a true, clean valve seat in a shorter time than is required by any other such material and should prove a great boon to those who have the exacting work of valve grinding in the railway

repair shop. It is doubtful if there is any branch of industry where an abrasive gets a more complete and rigorous test of its genuine worth than in a railway shop. Carborundum products are found in every department of nearly every big railway shop in the country. The following representatives of the Carborundum Company will be on hand at the exhibit: George R. Rayner, W. W. Sanderson, R. B. Fuller, C. C. Schumaker and Charles Nicholson.

NEW LIGHT ON STEEL PROTECTION.

BY G. B. HECKEL.

The new chemical theory of solution, osmosis, ionization, etc., developed by Farraday, Ostwald and others, has led to a revolution in our understanding of the corrosion of steel by rusting; and as practically applied by Dr. Allerton S. Cushman, of the Government Department of Public Roads, bids fair, also, to revolutionize not only the methods of steel manufacture in certain lines, but to change the entire scheme of painting and paint-making for the protection of steel structures.

To state the technical theory as concisely as possible, it may be said that the corrosion of steel and iron resulting from exposure is ordinarily due solely to auto-electrolysis; that is, an electrical current generated in the metal itself, and therefore requires the presence of an "electrolyte" or solvent, this electrolyte being, in most cases, water. Water is, to a small extent, always dissociated into its "ions," hydrogen and hydroxyl, the latter consisting of one atom of hydrogen and one atom of oxygen. The hydrogen ion carries a charge of positive and the hydroxyl ion a charge of negative electricity. Iron is soluble to a slight extent in pure water, the negative hydrogen ions exchanging electrical charges with the positive charges carried by the iron ions. To carry the process further, the presence of uncombined oxygen is necessary to unite with the hydrolized iron, free the hydrogen and precipitate the iron from the solution as an oxide. Any substance which, in solution, tends to dissociate and to increase the proportion of hydrogen ions, stimulates corrosion in iron to that extent. Of these the most familiar examples are the strong mineral acids, whose action proceeds so vigorously that hydrogen is set free and escapes in the form of bubbles.

Any equalities in the structure of steel capable of producing differences in electrical tension are capable of forming a "galvanic pair," needing only the contact of an electrolyte to start a current. Thus segregated manganese will form an electric couple with the steel in which it occurs; the compression caused by punching or bending will produce a differential, while differences in "temper" will induce the same condition.

But it has been found that certain oxidizing substances, as well as certain reducing substances, in contact with iron, will induce a condition of passiveness, during which its "solution-pressure," or tendency to go into solution, is annulled, and the free hydrogen ions can no longer perform their function in corrosion. Without attempting to go into the various theories to account for this fact, we may accept it as definitely settled that it is a fact which must be taken into consideration when we would advise a protective coating for steel; as must also the converse fact, that certain other materials, probably because of the ease with which they dissociate and ionize in solution, tend to facilitate or stimulate corrosion.

These facts have been very clearly demonstrated by Dr. Cushman in several bulletins issued by the Agricultural Department, and his work has been duplicated with very close agreement by others.

Of the materials found to be inhibitive of corrosion, the soluble chromates stand very high, steel having been found to be practically uncorrodible in a solution of these salts. This fact led to an investigation of the chrome pigments, and it was found that these, excepting a few in which an acid reaction is maintained, are all similarly inhibitive; zinc chrome most conspicuously so. Zinc oxide and zinc lead white also rank high, white lead moderately high, while red lead ranks lower, etc.

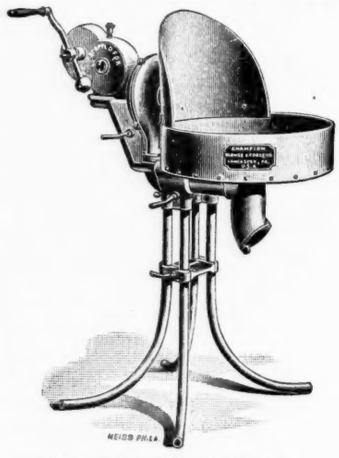
On the other hand, a large number of commonly employed pigments appear to be either neutral or indeterminable, while still others, as was anticipated, seem to be more or less powerful stimulants of corrosion. Out of this mass of tentatively accepted facts has developed a provisional theory, along which the more advanced manufacturers are now engaged in working out a new mode of procedure in the painting of steel.

The theory is that rust-stimulating pigments should never be placed in contact with the steel surface, but that an inhibiting priming coat should always intervene. This inhibitive coating may be suitably compounded of chromes, zinc oxide, white lead, red lead, willow charcoal, etc.; among the inhibitors, or of any neutral or indeterminate pigments, reinforced with a small proportion of the stronger inhibitors, such as zinc chrome, zinc oxide, zinc and lead chrome, etc. Over this priming coat the air and moisture-excluding coats can then be safely applied, these being designed for protection only, without regard to inhibitive qualities.

The Bureau of Promotion and Development of the Paint Manufacturers' Association, in conjunction with Committees E and U of the American Society for Testing Materials, is now engaged in a series of exhaustive field tests at Ventnor, N. J., near Atlantic City, with a view to further development of these theories in actual practice.

CHAMPION RIVET FORGE.

The accompanying engraving illustrates the No. 401 steel rivet forge manufactured by the Champion Blower & Forge Co., Lancaster, Pa., maker of blowers, forges, drill presses, etc. This particular forge has been on the market for 10 years and the manufacturer reports that it is used by about 99 per cent. of the structural steel builders, railways, bridge builders, boiler and structural iron workers of the world. This forge is constructed of structural steel throughout, making it strong and durable. Its gearing is the No. 400 Champion "Patented" high speed spiral gearing, made with adjustable ball bearings throughout to insure ease of operation without noise. It can easily be taken apart for transportation and again set up in a few minutes. It is light in weight and readily moved from one place to another, and is guaranteed to produce a welding heat, on 4-in. iron, in 10 minutes; the crank turns either way to produce the blast. This particular forge is made in three sizes, with hearths 18, 22 and 24 inches in diameter, and can be furnished with half hood or closed hood as desired.



Champion Rivet Forge.

The claims of superiority made for this forge include durability, efficiency and high capacity.

WESTINGHOUSE GALVANIZED ANNEALED-STEEL HOSE CLAMP.

The Westinghouse galvanized annealed-steel hose clamp has been developed to meet the demand for a device which will last indefinitely and avoid the loss due to breakage in removing and applying a malleable-iron clamp.

This steel clamp is made from a drop forging and has advantages over the malleable clamp in that it is tougher, stronger and more uniform, and consequently can be applied any number of times without breaking.

At the exhibit of the Westinghouse Air Brake Co., Pittsburg, Pa., are shown samples of the annealed-steel hose clamp made in standard sizes, the neat appearance of which will attract particular attention; also a few samples that have been considerably distorted without straining in the slightest degree the materials of which the clamps are made.

The exhibit of the Farlow Draft Gear Co., Baltimore, Md., is located again this year in the Annex, and is in front of the Convention Hall, which location is one of the most attractive ones on the Pier. Each year it has exhibited full-sized models of its draft gear as applied on different railways. This year it has come to the front strong with seven new models, showing different designs of the gear as it is in service. One interesting model shows a combination plate and angle draft arm for wooden underframe cars. This design is becoming very popular for repairs to old equipment; it eliminates the wood draft sills and gives additional strength to the center sills where it is needed, over the bolster. The malleable iron draft sills, which it shows, have proven in years of service to be as strong and as good as they look. The attachments for friction gears are proving most economical to roads using them. They protect and save the friction barrel from bursting and eliminate the riveted yoke. The repairs necessitated by yoke rivets shearing and the yokes themselves breaking constitute the largest item of expense in draft rigging repairs. To eliminate this expense is a big saver and is overlooked by railway men more than it should be.

The most annoying conditions with which many locomotive enginemen have to contend are caused by leaky air pumps and throttles, which conditions are usually brought about through the use of inferior or defective packings. Locomotive failures, resulting from air pump or throttle packings blowing out, frequently necessitating the drawing of fires and delay of trains, while pumps or throttles are being repacked, add materially to the operating expenses of railways. Specially designed sets of packings, manufactured of the best quality of material suitable to meet the severe conditions of service on air pumps and throttles and guaranteed not to fail or blow out, are being supplied by the Garlock Packing Co., Palmyra, N. Y., to many of the largest railway systems in the country. Since the adoption of Garlock packings by these roads, throttle and air pump packing failures have been entirely eliminated, which proves that the best is never too good but always most economical.

The T. H. Symington Co., Baltimore, Md., has a graphic illustration of the quality of material used in its malleable iron journal boxes for freight service in the way of several journal boxes which have been distorted under heavy hydraulic pressure without breaking or showing cracks. These boxes have been squeezed in a hydraulic press under a pressure of 55 tons, the pressure being applied along the side walls about midway of the depth of the box. The Symington company claims a uniformity and excellence of material in all the malleable iron castings produced by it not exceeded by any manufacturers of malleable iron in this country. Its claim seems to be very well substantiated by the specimen journal boxes referred to.

LIST OF EXHIBITS.

Owing to the fact that some exhibits are yet to be installed while others are incomplete, it is impossible to give at this time a list of all exhibits. The following list is nearly complete, however, and we shall be grateful to exhibitors if they will leave corrections or additions at the office of the *Railroad Age Gazette:*

A. B. C. Bearing Corporation, Chicago, Ill.—Journal bearings. Represented by W. D. Thomas and F. A. Lester.

Adams & Westlake Company, Chicago, Ill.—Adlake-Newbold electric car lighting; (axle generation) Adlake acetylene gas car lighting; electric and gas fixtures; continuous basket racks with detachable bottoms; car trimmings; signal lamps and lanterns. Represented by E. L. Langworthy, G. L. Walters, A. S. Anderson, F. N. Grigg, Wm. J. Piersen, E. H. Stearns and R. M. Newbold.

Ajax Manufacturing Company, Cleveland, Ohio.—Improved "Ajax" bolt heading; upsetting and forging machine; new type of high-speed bulldozing and bending machine, with stop motion device; reclaiming rolls for re-rolling scrap; hot sawing and burring machine and sample forgings. Represented by J. R. Blakeslee, J. A. Murray, A. L. Guilford and Henry Gaul.

American Balance Valve Company, Jersey Shore, Pa.—Balanced main valves for slide valve engines of highest pressures; balanced main valves for piston valve engines; simple and compound engine valves; piston valves after service; Walschaerts valve gear model; model of modified Stevens valve gear with internal admission and Jack Wilson double-acting valves. Represented by J. T. Wilson, F. Trump and C. C. Young.

American Blower Company, Detroit, Mich.—Blowers for forges and furnaces; heating and ventilating apparatus for stations, shops and roundhouses; mechanical draft apparatus for stationary boilers; automatic return steam traps; vertical enclosed self-oiling steam engines for electric lighting and pumping; Sirocco portable electric ventilating fans. Represented by Ralph T. Coe, Clayton W. Old and Benjamin Adams.

American Brake Company, St. Louis, Mo.—Automatic slack adjuster and flexible metallic joint for use between the engine and tender. Represented by E. L. Adreon.

American Brake Shoe & Foundry Company, Mahwah, N. J.—Steel back brake-shoes for locomotives; steel back brake-shoes for coaches; steel back brake-shoes for freight cars; reinforced extra durable high friction brake-shoes for all kinds of railway equipment; malleable iron brake heads. Represented by Otis H. Cutler, Jos. B. Terbell, Joel S. Coffin, F. W. Sargent, W. S. McGowan, E. L. Janes, G. R. Law, E. B. Smith, R. M. Brower, E. J. Searles, R. E. Holt, F. H. Coolidge, E. A. Gregory, N. J. Holden, J. H. Yardley, B. H. Grundy, J. S. Thompson, C. C. Higgins and L. R. Dewey.

American Car & Foundry Company, New York, St. Louis and Chicago.—Reception booth only. Represented by Scott H. Blewett, John McEwen Ames, William C. Dickerman, George Johnson, Clark D. Eaton, S. S. De Lano, A. E. Ostrander and William M. Hager.

American Engineer and Railroad Journal, New York, N. Y.—Represented by R. M. Van Arsdale, J. S. Bonsall, F. H. Thompson, R. V. Wright and E. A. Averill.

American Joxyl Company, New York, N. Y.—Car ceiling and panels; decorations in wood. Represented by C. H. Spotts and Edgard Josz.

American Locomotive Company, New York, N. Y.—Reception booth only.—Represented by W. H. Marshall, C. J. Donahue, G. M. Basford, David Van Alstyne, James McNaughton, J. D. Sawyer, J. E. Dixon, W. S. Seamans, Jr., H. C. Hequembourg, J. R. Marshall, J. R. Magarvey, W. E. Woodard, S. W. Miller, C. A. Strom, George Gurry, J. B. Ennis, C. J. Mellin, Wm. Dalton, A. M. White, W. L. Reid, A. W. Wheatley, F. J. Cole, F. W. Cooke, F. A. Haughton, J. G. Blunt and A. Haller.

American Mason Safety Tread Company, Boston, Mass.—Mason safety treads; Empire treads; Karbolith composition floors for coaches and buildings. Represented by Henry C. King.

American Nut & Bolt Fastener Company, Pittsburgh, Pa.—One side of diamond arch bar truck equipped with Bartley fasteners; model showing multiple and wood fasteners as applied for general use; samples of Bartley fasteners. Represented by Milton Bartley, Edwin M. White, Christopher Murphy and Robert Spencer.

American Radiator Company, Chicago, Ill.—Steam and hot water boilers; radiators; tank heaters; hot blast heaters; improved car heaters; packless valves; temperature regulators and automatic air valves. Represented by James H. Davis, George D. Hoffman and J. H. Ives.

American Specialty Company, Chicago, Ill.—"Use-Em-Up" drill sockets and sleeves; Collis high speed flat and flat twisted drills; Universal adjustable blade reamers. Represented by H. L. Mills.

American Steel Foundries, Chicago, Ill.—Three cast steel body bolsters; 4 cast steel truck bolsters; 4 simplex truck bolsters; 3 simplex body bolsters; 11 acme 5-in. and 6-in. I-beam brake beams; 12 Ajax and Hercules channel and rod truss beams; freight and passenger car and locomotive and tender springs. Entire truck mounted complete on moving turntable; various kinds of Susemihl roller side bearings; Janney and Simplex freight, passenger, tender and pilot couplers. Represented by J. V. Bell, T. D. Kelley, P. J. Kalman, G. E. Slaughter, R. H. Ripley, J. F. Dalman, E. T. Harris, H. P. Shaw, W. A. Blanchard, G. E. Scott, J. C. Davis, J. S. Smith, F. K. Shults, G. C. Murray, Theo. Cook, D. W. Call, A. R. Brunker, M. R. McLean, E. P. Kinne, W. W. Butler, A. S. Crozier, F. B. Ernst, W. Ro s Gravener, R. E. Janney and J. R. Stuart.

American Tool Works Company, Cincinnati, Ohio.—No. 1 24-in. x 12-ft. motor-driven lathe equipped with Northern motor; No. 2 36-in. x 36-in. x 10-ft. motor-driven multi-speed planer, equipped with Westinghouse motor and graphic recording meter; No. 3 25-in. motor-driven crank shaper with speed box, driven by General Electric motor; No. 4 5-ft. triple-geared high-speed plain radial drill, driven by Crocker-Wheeler motor; No. 5 2-ft. high-speed ball-bearing sensitive radial drill with tapping attachment, driven by a Lincoln motor, and No. 6 Willey motor-driven water tool grinder, 16-in. x 2-in. wheel. Represented by J. B. Doan, Robt. S. Alter, C. H. Doan and E. R. Connors.

American Vanadium Company, Pittsburgh, Pa.—Vanadium ores, alloys and steels, both wrought and cast; Vanadium cast iron; Vanadium brasses, bronzes and copper, also Vanadium aluminum and other products. Represented by J. J. Flannery, Jos. M. Flannery, J. Kent Smith, G. L. Norris and W. J. Bird.

Armstrong-Blum Manufacturing Company, Chicago, Ill.—Marvel power hack saw machines; portable grinders for lathes and planers; lever punches and shears; Metallic weather strip for coaches. Represented by Francis J. Blum.

Anchor Packing Company, Philadelphia, Pa.—Metal and fibrous packings and mechanical rubber goods. Represented by L. E. Adams, W. R. Haggart and E. C. Adams.

Armstrong Brothers Tool Company, Chicago, Ill.—Tool holders, ratchet drills and machine shop specialties. Represented by E. V. Galen, John McBride and Paul Armstrong.

Asbestos Protected Metal Company, Canton, Mass.—Headlinings and sheathing for steam and electric cars; Robertson box car roof; controller box lining and general insulation; roofing and siding for railway structures. Represented by H. H. Robertson, E. T. Newsome, J. T. Crawford, Roswell Howe, P. H. Wilhelm, E. V. Donelson and P. M. Stewart.

Ashton Valve Company, Boston, Mass.—Locomotive gages and pop valves; dynamometer recording gages. Represented by F. A. Casey and J. W. Motherwell.

Atha Steel Casting Company, Newark, N. J.—Atha cast steel body and truck bolsters; manganese steel railway motor gears and pinions. Represented by C. W. Owston, Jr., G. T. Paraschos, A. S. Blanchard, J. Kissick, Jr., L. M. Atha and L. A. Shepard.

Barnett Equipment Company of America, New York, N. Y.—The Barnett connector, the Universal steam coupler. Represented by Stephen D. Barnett, David E. Green and Lewis G. Morris.

Besly & Company, Charles H., Chicago, Ill.—No. 14 Besly spiral disc grinder, Helmet spiral circles, temper taps, oil and babbitt. Represented by Edward P. Welles, Charles A. Knill and W. H. Allen.

Bettendorf Axle Company, Davenport, Iowa.—One 100,000-lbs. capacity gondola underframe and one 60,000-lbs. capacity refrigerator car underframe equipped with Bettendorf trucks; one set of 40-ton trucks; one all-steel box car model, ⅛ size. Represented by W. P. Bettendorf, J. W. Bettendorf, J. H. Bendixen, A. F. MacPherson, E. E. Silk and W. G. Ransom.

Boker & Company, Herrmann; New York, N. Y.—Novo superior steel, the new high-speed steel; also various high-speed tools, etc.; intra steel and other brands of steels. Represented by Ellsworth Haring.

Booth Company, L. M., New York, N. Y.—Booth water softener, 2,500 gallons per hour purifying capacity, in operation; photographs, drawings, etc., of installations. Represented by W. R. Toppan, L. M. Booth and A. J. Donniez.

Bordo Company, L. J., Philadelphia, Pa.—Bordo blow-off valve; swing joints; Bordo water gage. Represented by L. J. Bordo, C. W. Allen and C. R. Weaver.

Bowser & Company, Inc., S. F., Fort Wayne, Ind.—Oil storage systems complete; long distance self-measuring pumps; power pumps; automatic registering oil meters; oil storage tanks of all sizes and shapes, with pumps for handling and measuring all kinds of lubricating, paint and other oils, including gasolene, etc.; suitable for storehouses, machine and paint shops, roundhouses, engine rooms, signal towers, automobile garages, etc. Represented by C. A. Dunkelberg, W. T. Simpson and F. T. Hyndman.

Brighton Brass & Bronze Company, Pittsburg, Pa.—Journal bearings made of various mixtures and "Brighton" bearings; engine brasses; driving boxes; rod bushings; mill brasses. Represented by W. H. Schoen and T. M. May.

Brown & Sharpe Manufacturing Company, Providence, R. I.—Vertical spindle milling machines, plain milling machines and attachments for milling machines.

Buckeye Steel Castings Company, Columbus, Ohio.—Major and Columbia freight car couplers and Ohio passenger couplers; cast steel journal boxes of various sizes; cast steel Buckeye yokes; full sized freight car truck equipped with Buckeye cast steel side frames and cast steel journal boxes. Represented by S. P. Bush, George Groobey, C. B. Goodspeed, A. H. Thomas, Geo. T. Johnson and J. C. Whitridge.

Buffalo Brake-Beam Company, New York, N. Y.—Truss I-beams and special section brake-beams for all classes of equipment; also forged heads, fulcrums, chain clips and wheel guards. Represented by S. A. Crone, E. Strassburger, R. C. Fraser and C. E. Barrett.

Bullard Car Door Equipment Company, Birmingham, Ala.—Car doors.

Bullard Machine Tool Company, Bridgeport, Conn.—Bullard vertical turret lathe in operation. Represented by S. H. Bullard, J. W. Bray, R. H. Snider, J. H. Van Yorx, Jr., and Wm. J. Alles.

Burroughs Adding Machine Company, Detroit, Mich.—Burroughs adding and listing machines for all departments of railway work. Style 15 for motive power and general railway accounting; No. 11 for car accounting, No. 9 for division superintendents and local freight accounts, and Nos. 7 and 6x for local freight, ticket and express accounts. Represented by F. A. Willard, Ward Gavett and E. G. Griffith.

Carborundum Company, Niagara Falls, N. Y.—Carborundum wheels; sharpening stones; rubbing bricks; carborundum paper and cloth; garnet paper; carborundum valve grinding compound. Represented by George R. Rayner, W. W. Sanderson, R. B. Fuller, C. C. Schumaker and Chas. Nicholson.

Cardwell Manufacturing Company, Chicago, Ill.—Cardwell rocker side bearings. Represented by J. R. Cardwell, Jno. D. Ristine, C. H. Tobias and W G. Krauser.

Carnegie Steel Company, Pittsburg, Pa.—Schoen steel wheels for freight, passenger, engine truck and tender service. Pair of high-record wheels mounted on axle from Bessemer & Lake Erie Railroad. Typical Interurban Rail-

way wheel. United States Steel sheet piling and symmetrical interlock channel bar piling. Carnegie steel cross ties, fittings and new type rail sections. Duquesne rail joints. Slack barrel kegs for spikes; track bolts, etc. Arch bars of soft welding steel. Soft welding and threading steel for locomotive and car parts and general railway use. Represented by John C. Neale, W. G. Clyde, W. A. Bostwick, L. C. Bihler, James B. Bonner, R. B. Woodworth, C. G. Bacon, Jr., H. W. Maxson, V. S. Yarnall, C. L. Wood, R. H. Watson, J. H. McAlarney and George Summers.

Carter Iron Company, Pittsburgh, Pa.—Stay-bolt iron; chain cable iron; engine bolt iron. Represented by W. C. Johnston, Christopher Murphy and Robert Spencer.

Celfor Tool Company, Chicago, Ill.—Celfor high-speed drills, reamers, countersinks, three-lipped drills, Rich flat drills, Celfor duplex and precision chucks, reamer sockets, etc. Represented by E. B. Clark, William Brewster, M. L. Hanlin, W. E. McCabe, J. J. Dale, Chas. A. Bucher and Edwin B. Ross.

Chase & Company, L. C., Boston, Mass.—Goat brand car plushes in plain and frieze effects; Angora mohair showing process of manufacture; Chase's car seat duck. Represented by Frank Hopewell and R. R. Bishop, Jr.

Chicago Car Heating Company, Chicago, Ill.—Vapor system of car heating with multiple regulation of heat; steam hose coupler, train-pipe valves, car heater specialties and Baker heater specialties. Represented by Egbert H. Gold, E. A. Schreiber, Frank F. Coggin, W. H. Hooper, B. A. Keeler and Eugene E. Smith.

Chicago Railway Equipment Company, Chicago, Ill.—Brake-beams of the Creco, Diamond, National Hollow, Kewanee, Reliance, Sterlingworth, Ninety-six and Monarch types; Monitor bolsters, Creco roller side bearings, Creco slack adjuster, Creco journal box and lid, Creco brake jaw, automatically adjustable brake heads. Represented by E. B. Leigh, F. T. De Long, E. G. Buchanan, Geo. A. Cooper, F. G. Ely, H. W. Finnell, Harry W. Frost, B. F. Pilson, Raymond H. Pilson, G. N. Sweringen, C. H. Williams, Jr., and C. P. Williams.

Chicago Varnish Company, Chicago, Ill.—Car sides with the "Ce-Ve Process" of six-day painting cars on them. Represented by Geo. S. Bigelow, H. J. Green, F. L. Olds, O. R. Ford, A. C. Morgan and W. G. Scott.

Chisholm & Moore Manufacturing Company, Cleveland, Ohio.—One thirty-ton chain hoist, largest ever made; trolley hoists of various sizes. Represented by H. E. Dickerman and E. Y. Moore.

Chrome Steel Works, Chrome, N. J.—Steel car wheels with cast steel centers and forged tires, tires interlocking and keyed to center. Represented by F. E. Canda and William Corry.

Cincinnati Bickford Tool Company, Cincinnati, Ohio.—One high-speed 24-in. sliding head drill; one high-speed 20-in. sliding head drill; one 5-in. high-speed radial drill. Represented by August H. Tuechter, Sherman C. Schauer, H. M. Norris, H. L. Beeler and Wm. Shafer.

Cincinnati Planer Company, Cincinnati, Ohio.—One 37 x 37 x 8-ft. forge planer with four heads and variable speed motor drive. Represented by B. B. Quillen, George Langen and Joseph Herman.

Cleveland Twist Drill Company, Cleveland, Ohio.—Twist drills, reamers, taps and sockets. Represented by E. H. Jung, E. G. Buckwell and W. E. Caldwell.

Clow & Sons, James B., Chicago, Ill.—Plumbing fixtures; steam, gas and water heating apparatus for railway buildings and cars; Eddy valves, hydrants; Jefferson unions, and flanges; fountain brushes. Represented by L. J. Elliott and Yates A. Adams.

Coe Brass Manufacturing Company, Ansonia, Conn.—Extruded metal in the form of special shaped brass bars. Represented by E. J. Steele, Wm. W. Cotter, Wm. H. Rippere and Chas. E. Van Riper.

Coe Manufacturing Company, W. H., Providence, R. I.—Coe's ribbon gold leaf and Coe's gilding wheels. Represented by Chas. H. Bowers and Wm. H. Larney.

Commercial Acetylene Company, New York City, N. Y.—Acetylene headlights; acetylene signal lamps and car lighting system; acetylene safety storage tank, showing asbestos packing. Flashing apparatus as used by U. S. Government for buoys, beacons and lighthouses, with sun valve, which automatically shuts off and turns on the gas. Represented by R. E. Bruckner, H. G. Doran, R. J. Faure and Oscar F. Osiby.

Commonwealth Steel Company, St. Louis, Mo.—Aluminum models of car and locomotive underframes and bolsters, also photographs of various devices made by the company. Represented by Harry M. Pflager, Geo. E. Howard and Frank S. Barks.

Consolidated Car-Heating Company, Albany, N. Y.—Quick opening end valves, vapor and pressure steam heating systems, improved types of steam couplers and signaling system. Represented by Cornell S. Hawley, W. S. Hammond, Jr., Thomas Farmer, Jr., C. C. Nuckols, H. L. Hawley and J. E. Marble.

Consolidated Railway Electric Lighting & Equipment Company, New York, N. Y.—Standard type "D" equipment of 4 kw. capacity and its standard type "F" equipment of 2 kw. capacity, both assembled and in parts. Also the Kennedy regulator. Represented by P. Kennedy, J. L. Watson, Thos. L. Mount and L. J. Kennedy.

Crane Company, Chicago, Ill.—Locomotive pop safety valves, locomotive blow-off valves, locomotive special globe and angle valves, Crane valves for superheated steam, steel valves and fittings for superheated steam, ferrosteel valves and fittings, pipe bends, steam separators, special exhibit of Crane tilt steam traps in operation. Represented by F. D. Fenn.

Crosby Steam Gage & Valve Company, Boston, Mass.—Locomotive safety valves; gages; blow-off valves; chime whistles, and other articles for locomotives. Represented by E. C. Kenyon, J. J. McConnick and A. B. Carhart.

Curtain Supply Company, Chicago, Ill.—Ring fixtures, Forsyth roller tip fixture, vestibule curtain handle and curtain materials of all kinds. Represented by W. H. Forsyth, R. F. Hayes and S. W. Midgley.

Dake-American Steam Turbine Company, Grand Rapids, Mich.—One Dake turbine electric headlight generating set.

Damascus Brake-Beam Company, Cleveland, Ohio.—Damascus and Waycott freight and tender beams; high-speed beam with adjustable head; adjustable brake heads and forged steel fulcrums. Represented by A. D. McAdam, P. T. Handiges and Albert Waycott.

Davis-Bournonville Company, New York, N. Y.—Davis-Bournonville oxy-acetylene welding and cutting plant, also an oxygen generator and compressor. Represented by Augustine Davis, Eugene Bournonville, C. B. Wortham, W. R. Noxon, Mr. Joyce and J. W. Perry.

Davis Solid Truss Brake Beam Company, Wilmington, Del.—Davis solid truss brake beams and Davis solid steel back brake shoe. Represented by Nathan H. Davis, Thomas C. Davis and C. Theo. Buchholz.

Dayton Malleable Iron Company, Dayton, Ohio.—General railroad malleables and specialties. Represented by Pierce D. Schenck, Jos. G. Crane and R. A. Herbruck.

Dearborn Drug & Chemical Works, Chicago, Ill.—Method of scientific treatment of boiler feed water. Represented by Robert F. Carr, George R. Carr, G. W. Spear, J. D. Purcell, H. G. McConnaughy, C. H. Everett, Paul T. Payne, A. W. Crouch and D. E. Cain.

Detroit Lubricator Company, Detroit, Mich.—Locomotive lubricators Nos. 0, 5, 11, 21. Sectional of 21, 31, 41, 61. Single and double sight feed air cylinder lubricators. Improved air brake lubricator; standard stationary lubricator. No. 400 bull's-eye type stationary lubricator. "Detroit" sight feed guide cup and improved rod cup. Represented by F. W. Hodges, A. D. Homard and Herbert I. Lord.

Dickinson, Paul, Incorporated, Chicago, Ill.—Dickinson smoke-jacks shown in cast iron, fire-proofed wood and a combination of these two materials; cast iron ventilators and cast iron chimneys. Represented by Arthur J. Filkins and John A. Meaden.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Dixon's silica-graphite paint for steel cars; also lubricants and other graphite products. Represented by Wm. Houston, H. A. Nealley, De Witt C. Smith, L. H. Snyder and T. J. Tucker.

Dressel Railway Lamp Works, New York, N. Y.—Locomotive headlights, locomotive classification lamps, passenger car tail lamps, center coach lamps, semaphore lamps, switch lamps, station lamps and gage lamps. Represented by F. W. Dressel, Robert Black, H. S. Hoskinson, F. W. Edmunds, Edw. W. Hodgkins and W. E. Chester.

Dudgeon, Richard, New York, N. Y.—Universal jacks and test pumps in many forms, including car inspector's, railway, plain, base, claw, independent claw, horizontal and traversing jacks; electrical power pump, and several types of hand-operated pressure pumps. Represented by James W. Nelson, William H. Mathers and J. J. Dickinson.

Duff Manufacturing Company, Pittsburgh, Pa.—Barrett track and car jacks, "Duff-Bethlehem" forged steel hydraulic jacks, Duff ball-bearing screw jacks, journal jacks, geared ratchet jacks and wrecking jacks. Represented by Thos. A. McGinley, E. A. Johnson and Geo. A. Edgin.

Duntley Manufacturing Company, Chicago, Ill.—Duntley vacuum cleaners for passenger coaches and the smaller vacuum cleaners for household purposes. Represented by Charles E. Walker, C. R. Ely and James Boswell.

Edwards Company, O. M., Syracuse, N. Y.—Automatic steel trap-door for coach platforms, metal sash, car window fixtures, sash balances. Represented by O. M. Edwards, E. F. Chaffee, G. G. Norris and C. H. Rockwell.

Electric Hose & Rubber Company, Wilmington, Del.—Braided fabric rubber hose. Represented by W. P. Barnum, A. W. Archer, Jr., Wm. M. Sibley, E. F. Brownworth, C. R. Blanchard and C. D. Garretson.

Electric Railway Journal, New York, N. Y.—Copies of Electric Railway Journal and engineering books. Represented by James H. McGraw, J. M. Wakeman, H. W. Blake, Rodney Hitt, C. A. Babtiste, W. K. Beard and J. A. Kucera.

Electric Storage Battery Company, Philadelphia, Pa.—Largest central station cell in the world, type 131-H Exide battery, capacity 22,000 amp. hrs.; various types of exide cells; large map showing the distributing system of Exide material throughout the United States; an exaggerated ammeter showing current consumed by electric vehicles upon different grades. Represented by Charles Blizard, Frank Stone, R. B. Daggett, G. H. Atkin, E. L. Reynolds, H. B. Gay, Albert Taylor, H. H. Seaman and H. L. Marshall.

Fairbanks, Morse & Company, Chicago, Ill.—Two gasolene hand cars, one in exhibit booth and one on the P. & R. tracks; Sheffield telescopic water column; Duff hydraulic jack of a new style; F. M. & Company tool grinder. Represented by George J. Akers, A. A. Taylor, R. A. Patterson, J. A. Steele and R. E. Derby.

Farlow Draft Gear Company, Baltimore, Md.—Farlow twin spring draft gear as applied to both channel and wooden sills. Farlow twin spring draft gear as applied to engine tenders. Farlow draft gear attachments with friction barrels applied to channel sills. Represented by M. A. Garrett, D. F. Mallory, I. O. Wright, B. S. Johnson and C. M. Garrett.

Fisher & Norris ("Eagle" Anvil Works), Trenton, N. J.—Steel faced anvils for blacksmiths, band-saw and saw makers, chain makers and axe makers. Coppersmiths' stakes. Fisher double-screw parallel leg vises, Fisher-Brooks solid nut stationary and swivel base bench vises. Fisher-Brooks special woodworkers' vise; blacksmiths' swage-block and stand; "Cross-Pene," "Dog-Head" and "Twist-Face" hand made hammers. Represented by Mrs. Harriet Fisher and Harold Fisher Brooks.

Flannery Bolt Company, Pittsburgh, Penna.—Tate flexible staybolts and installation tools for applying same; "F. B. C." arch bar and continuous nut locks. Represented by J. Rogers Flannery, W. M. Wilson, Barton H. Grundy, B. E. D. Stafford, Harry A. Pike, Jos. M. Flannery, Tom R. Davis, Thos. J. Leahey and Jas. J. Flannery.

Foster, Walter H., New York, N. Y.—Bolt turning machine; staybolt threading and reducing machine; staybolt cold squaring machine; two Potter & Johnson bolt altering machines; staybolt drilling machine; staybolt nipper; lathe dog. Represented by Walter H. Foster and C. K. Lasseter.

Forsyth Brothers Company, Chicago, Ill.—Forsyth high capacity buffing device for passenger cars; radial draw-bar centering device; metallic window sash and safety deck sash ratchets. Represented by George H. Forsyth, A. H. Sisson and A. L. Whipple.

Forsyth Steel Tie Company, Pittsburg, Pa.—Steel cross ties; tie plates; brake shoe keys; follower plates; brake levers; trolley poles; railbenders; sheet piling; tie braces; railway forgings. Represented by W. D. Forsyth, A. C. Schiller and T. D. Dallmeyer.

France Packing Co., Tacony, Phila.—Metallic and fibrous packings. Represented by A. W. France.

Franklin Manufacturing Company, Franklin, Pa.—Reinforced corrugated asbestos roofing or siding, asbestos century shingles, asbestos building lumber, asbestos building lumber smoke-jacks; 85 per cent. K. & M. brand magnesia sectional locomotives lagging; Franklin rubber roofing; asbestos pipe coverings; asbestos ring air pump and throttle packing; asbestos dust guards; papers, boards, packings and other asbestos railway supplies; wool and cotton waste. Represented by R. J. Evans, E. R. Rayburn, G. S. Stuart and L. B. Melville.

Franklin Railway Supply Company, New York, N. Y.—Franklin automatic driving box lubricator; Franklin pneumatic fire door; McLaughlin flexible joint; Franklin grate shaker; Franklin ball joint; McLaughlin lock nut; Franklin grease forming machine; Franklin steam chest plug. Represented by J. S. Coffin, Samuel G. Allen, A. G. Elvin, C. L. Winey, Paul Weiller, W. H. Coyle, R. G. Coburn and H. S. Hayward, Jr.

Frost Railway Supply Company, Detroit, Mich.—Harvey friction draft springs; Detroit metal weather strips. Represented by Harry W. Frost, George A. Cooper and George L. Harvey.

Galena-Signal Oil Company, Franklin, Pa.—Reception booth. Represented by Samuel A. Megeath, Edw. V. Sedgwick, Harry Hillyer, W. E. Brumble, J. W. Bunn, Lewis Gleason, J. F. Gettrust, E. W. Hayes, D. J. Justice, J. E. Linahen, G. E. McVicar, C. B. Royal, J. A. Whalen, A. B. Wright, C. C. Steinbrenner, W. A. Trubee, F. A. Guild, E. H. Baker, B. H. Grundy, G. L. Morton, J. S. Patterson, J. E. Hall, Robert McVicar.

Garlock Packing Co., Palmyra, N. Y.—Fibrous and metal packings for general shop purposes; special air pump and throttle packings, gaskets, pump valves and sheet packings; mechanical rubber and asbestos goods. Represented by F. A. Ebert, J. E. Hillerman, F. S. Bulkley, A. S. Jacques, A. E. Robbins, H. N. Winner, J. J. Pokorney, G. A. Morrison and Jno. N. Todd.

General Compressed Air & Vacuum Machinery Company, St. Louis, Mo.—Thurman portable electric vacuum cleaner, with a full complement of tools for cleaning every part of the home. Represented by Albert R. Thomas.

General Electric Company, Schenectady, N. Y.—One gas-electric car. Reception booth maintained on the pier. Car will be exhibited on the exhibition tracks. Represented by C. E. Barry, W. J. Clark, W. B. Potter, R. E. Moore, A. W. Jones, F. H. Gale, C. C. Pierce, H. D. Hawks, M. F. Corbin, A. I. Totten, A. H. Armstrong and G. H. Hill.

General Railway Supply Company, Chicago, Ill.—Metallic (steel) sheathing; National steel trap doors and lifting device; Schroyer friction curtain rollers and fixtures; Garland ventilators; end of a vestibuled passenger coach

equipped to show the application of Flexolith composition flooring; National vestibule curtain catches; National standard roofing; Imperial car window screens; Perfection sash balance and roller deck sash ratchet. Represented by F. L. Wells, H. U. Morton, L. C. Bassford and W. S. Humes, Jr.

Gold Car Heating & Lighting Company, New York. N, Y.—Car heating and car lighting apparatus. Represented by Edward E. Gold, William E. Banks, E. B. Wilson, W. H. Stocks, Geo. F. Ivers, F. A. Purdy, J. M. Stayman, F. T. Kitchen, J. O. Brombaugh and F. H. Smith.

Goldschmidt Thermit Company, New York, N. Y.—Thermit; methods for welding locomotive frames, driving wheel spokes, connecting rods and mudrings; fire brick molds for welding locomotive frames; metals manufactured by the aluminothermic process; samples of welds on pipes and wrought iron and steel sections; thermit in cans for reviving dull iron in the ladle; Titanium thermit in cans for purifying iron and steel; welded rail joints and compromise joints. Represented by H. S. Mann and A. M. Guenther.

Gould Coupler Company, New York, N. Y.—M. C. B. couplers; Gould malleable iron journal boxes; Gould side-unlock coupler; Moritz M. C. B. coupler; Gould friction draft gears; Gould cast steel side frame; Gould cast steel journal box; Crown bolster that has been tested; Gould special electric locomotive coupler; Hartman ball-bearing center plates and side bearings; special malleable iron draft rigging and striking plates. Frame with Gould body bolster freight coupler, friction draft gear and steel draft frames. Gould draft gear, new passenger coupler, rightning device and Gould vestibule. Represented by F. P. Huntley, G. G. Milne, H. N. Loomis, C. E. Rood, S. R. Fuller, Jr., W. F. Richards, W. M. Rogovine and Dr. C. W. Gould.

Gould & Eberhardt, Newark, N. J.—One 24-in. Eberhardt's patent high duty D. T. Q. shaping machine with Northern variable speed electric motor drive and special controller. Represented by Frederick L. Eberhardt, H. Ezra Eberhardt and Charles L. Cameron.

Gray & Sons, Inc., Peter, E. Cambridge, Mass.—Lamps, lanterns and sheet metal specialties for every department of railway service. Represented by George M. Gray, C. O. Harrington and J. M. Brown.

Greene, Tweed & Company, New York, N. Y.—Palmetto braided and twist packing; Palmetto air pump packing; Palmetto throttle valve packing; Manhattan packing; Favorite reversible ratchet wrench. Represented by F. E. Ransley and B. M. Bulkley.

Grip Nut Company, Chicago, Ill.—Grip nuts; Universal window fixtures; steel sash; Universal deck sash ratchets and car trimmings. Represented by E. R. Hibbard, B. C. McClellan, F. E. Miner, Herbert Green and J. W. Hibbard.

Hale and Kilburn Manufacturing Company, Philadelphia, Pa.—Car seats and seating of all kinds for standard railway cars; reclining seats and revolving chairs for chair cars; steel seats for all-steel railway cars; steel interior finish, bulkheads and trim, for all-steel cars; steel window sash for all-steel cars; steel doors for all-steel cars. Represented by H. T. Bigelow, A. F. Old, B. F. Pilson and C. W. Laskay.

Heywood Brothers & Wakefield Company, Wakefield, Mass.—Car seats of various types. Represented by E. C. Lang, C. W. H. Frederick and Bertram Berry.

Hill, Clarke & Company, Inc., Boston, Mass.—Five-foot, triple-geared, high-speed radial drill, No. 2 Milwaukee plain milling machine; No. 3 Milwaukee full universal milling machine, with various attachments; No. 2½ universal horizontal boring machine, with rapid milling feeds. Represented by C. A. Clarke, A. W. Wigglesworth, H. E. Wendland, S. E. Hale, Frank Sues, J. R. Richards and J. F. Owens.

Hammett, H. G., Troy, N. Y.—Trojan metallic packing; link radius grinder; trojan bell-ringer; oil cups. Represented by H. G. Hammett, E. C. Sawyer and A. O. Van Dervort.

Hanlon Locomotive Sander Company, Winchester, Mass.—The Hanlon sander. Represented by J. W. Russell, Jr., John H. Hanlon and W. J. Hanlon.

Harrington, Edwin, Son & Company, Inc., Philadelphia, Pa.—Geared and plain 4-wheeled travelers, lower flange of I-beam; spur-geared hoist; improved screw host and differential hoist. Represented by Roger Sherron, W. J. Somerset, M. W. Christian and A. M. Harrington.

Home Rubber Company, Trenton, N. J.—Black sheet packing; high and low pressure diagonal rod packing; hydraulic packing; flax packing; gum core packing; ring and combination packings. Represented by S. Butler Keys and A. R. Foley.

Hunt-Spiller Manufacturing Corporation, South Boston, Mass.—Locomotive parts made of Hunt-Spiller gun iron; crosshead shoes; piston valve packing rings; cylinder packing rings; eccentrics and straps, etc.; Hunt-Spiller gun iron; driving boxes; piston valve gages; piston valve packing; cylinder packing; shoes and wedges; gears; crosshead shoes, etc. Represented by Gordon Dexter, W. B. Leach and J. G. Platt.

Hutchins Car Roofing Company, Detroit, Mich.—Hutchins plastic car roofing, 2-ply, 3-ply and improved and surface-coated; Hutchins outside and inside metal roofs; Hutchins all-steel carlin roof; Detroit car door. On the exhibit track—Car M. C. 43,155 (equipped with Hutchins all-steel carlin roof); car Wabash 63,276 (equipped with Hutchins all-steel carlin roof and Detroit car door. Represented by Wm. D. Thompson, C. E. Latta and Carter Blatchford.

Illinois Malleable Iron Company, Chicago, Ill.—Brake shoes, smoke jacks and unions. Represented by E. M. Marshall and R. C. Warner.

Jenkins Brothers, New York, N. Y.—Valves; 96 packing; pump valves; gasket tubing; discs; Seller's injectors and Graber automatic water gage. Represented by A. C. Langston, H. D. Gordon, Frank Martin, B. J. Neely and Chas. Wick, Jr.

Johns-Manville Company, H. W., New York, N. Y.—Asbestos packing, roofing, pipe covering, wick and rope packing, asbestos cement, hair felt; vulcabeston gaskets, joint washers and pump valves, magnesia covering. Represented by H. J. Bellman, J. E. Meek, J. C. Younglove, H. O. Fettinger, H. G. Newman, L. J. Hibbards and S. M. Hildreth.

Joliet Railway Supply Company, Joliet, Ill.—Twelve new and tested Huntoon brake beams; twenty-four new and old service tested Perry side bearings; one electric vacuum cleaner. Represented by C. F. Huntoon, H. M. Perry and E. A. Laughlin.

Joyce, Cridland Company, Dayton, Ohio.—Railway jacks. Represented by Geo. W. Llewellyn, P. J. Ford and N. Kohl.

Keller Manufacturing Company, Philadelphia, Pa.—Vacuum cleaners. Represented by Julius Keller, W. P. Pressinger, Harry Keller and Howard Small.

Kelly-Arnold Manufacturing Company, Wilkes-Barre, Pa.—Automatic air and steam connector; metal conduits and auxiliary parts. Represented by George F. Royer and John J. O'Donnell.

Kerite Insulated Wire & Cable Company, New York, N. Y.—Section of Colon-Panama submarine cable, samples of aerial, underground and submarine cables, railway signal wire, sections of cables which have been in service from thirty to forty years, Kerite tape. Represented by R. D. Brixey, Azel Ames, P. W. Miller and J. A. Renton.

Keystone Drop Forge Works, Chester, Pa.—Keystone connecting link, Keystone safety shackle hook, special locomotive and car forgings. Represented by Geo. H. Berlin.

Keystone Lantern Company, Philadelphia, Pa.—The Casey standard railway hand-lantern. Represented by John T. Casey and Arthur H. McOwen.

Lackawanna Steel Company, New York, N. Y.—Rails; rail joints; tie plates; beams; channels; angles; steel plate; steel forging; corrugated and deformed bars; twisted squares; the Abbott base plate; sheet piling. Represented by F. E. Abbott and Blythe Harper.

Landis Machine Company, Waynesboro, Pa.—Motor-driven bolt and pipe threading machine, showing high-speed threading; samples of threaded work; bolt pointer. Represented by J. G. Benedict, Ira D. Grove and H. L. Fisher.

Landis Tool Company, Waynesboro, Pa.—Two rotary tool grinders. Represented by W. H. Foster.

Lightbody Safety Brake Rigging, Waterville, Maine.—Fox truck fitted with lever support; safety loop; safety bracket; safety chain; brake-beam rods and levers connected; brake-beam with safety appliance attached. Represented by J. A. Lightbody.

Linde Air Products Company, Buffalo, N. Y.—Oxy-Acetylene welding and Oxy-Coal gas cutting apparatus. Represented by Cecil Lightfoot, F. W. Wolff, F. C. Phillips, G. E. Kershaw, F. Schoonmaker and W. S. Roberts.

Link-Belt Company, Philadelphia, Pa.—Drive chains. Represented by Horace Bowman.

Lodge & Shipley Machinery Tool Company, Cincinnati, Ohio.—One 24 in. x 12 ft. patent head motor-driven lathe; one 18 in. x 8 ft. patent head motor-driven lathe. Represented by Wallace Carroll and Robert D. Betts.

Love Brake Shoe Company, Chicago, Ill.—Armbrust steel connector locomotive driver brake-shoes, steel connector flanged coach shoes, steel connector unflanged car shoes, steel connector electric railway brake-shoes, steel connector motor and coach shoes for elevated railway service. Represented by C. W. Armbrust, W. C. Nunn and E. H. Pilson.

Lupton's Sons Company, David, Philadelphia, Pa.—Lupton rolled steel skylight, Lupton rolled steel windows, Lupton hollow metal fire door and Pond operating device (for pivoted sash). Represented by Clarke P. Pond.

Manning, Maxwell & Moore, New York, N. Y.—Lathes; shapers; drills; borers; millers; Hancock inspirators; steam and check valves and globe and angle valves; Metropolitan injectors; hose strainers; blow-off valves; oil-cups; tank wells; whistles; consolidated pop safety valves; Ashcroft pressure and vacuum gages; Tabor steam indicators; and Edison recording gages. Represented by P. M. Brotherhood, J. N. Derby, W. O. Jacquette, Chas. L. Lyle, C. E. Randall, M. A. Sherritt and Frank P. Smith.

Mason Regulator Company, Boston, Mass.—Mason locomotive reducing valve, Mason reducing valves for steam, water and air; balanced valves, pump governors, pump pressure regulators, damper regulators, gravity pump governors and steam pumps. Represented by Frank A. Morrison.

Modoc Soap Company, Philadelphia, Pa.—Perfected car cleaner, renovator and linseed oil soap; Idealo car cleaner. Represented by Henry Roever and Jas. D. Holtzinger.

Monarch Steel Castings Company, Detroit, Mich.—Monarch No. 2 M. C. B. coupler and Monarch graduated draft gear. Represented by T. H. Simpson, A. B. Wetmore, Charles Gifford, A. R. Wilson and T. N. Motley.

Moran Flexible Steam Joint Company, Louisville, Ky.—Flexible joints for steam, air, gas and liquid steam coupler for use between engine and dynamo car. Represented by C. H. Jenkins.

McConway & Torley Company, Pittsburgh, Pa.—Pitt and Janney "X" freight couplers, Pitt tender coupler, Kelso passenger coupler, Buhoup 3-stem passenger coupler, McConway steel-tired wheel. Represented by Stephen C. Mason, E. M. Grove, Wm. McConway, Jr., Geo. W. McCandless, H. C. Buhoup and I. H. Milliken.

MacLeod & Company, Walter, Cincinnati, Ohio.—Working model of water softener and purifier, several tests of locomotive fire heaters, flue welding machine; also furnace, carbide lights for wrecking outfits and construction work, oil rivet forges, Buckeye heaters for repairing steel cars; the Buckeye light; also a new type of sand-blast machine. Represented by Walter MacLeod and W. F. Stodder.

National Railway Service Co., Chicago, Ill.—Schroyer uncoupling apparatus; Dohlin automatic car door fastener; Nichols car door fastener; Schoemaker fire-box door operator; Turnbull driving wheel flange lubricator and Rubbertex roofing. Represented by J. W. Luttrell, Frank Schoemaker, Jay G. Robinson and Percy P. Hinckley.

McCord & Company, Chicago, Ill.—Freight and passenger journal boxes, draft gear, force feed locomotive lubricators, spring dampeners, gaskets. Represented by Clive Runnells, J. A. Lamon, W. J. Schlacks and D. J. McOsker.

McIlvain & Company, J. Gibson, Philadelphia, Pa.—Lumber of all kinds, foreign and domestic. Represented by J. Gibson McIlvain, Jr., and T. A. Dalton.

Nathan Manufacturing Company, New York, N. Y.—Locomotive injectors of the lifting and non-lifting type, fire extinguisher, boiler washer and tester, reversible stop boiler check valve, Phillips double stop boiler check valve, steam whistles, relief valves, gage cocks, water gages, oilers and various other appliances for locomotives and stationary engine purposes. Represented by J. C. Currie, C. R. Kearns, S. Keeler, J. E. Minor, J. S. Seeley, M. Stettheimer and E. S. Toothe.

National-Acme Manufacturing Company, Cleveland, Ohio.—Acme automatic multiple spindle screw machines, single belt drive and motor drive. Represented by L. M. Waite, W. S. Chase and J. F. Judd.

National Boiler Washing Company, Chicago, Ill.—Blue prints and photographs of boiler-washing systems installed. Represented by W. White.

National Lock Washer Company, Newark, N. J.—Car curtains, curtain fixtures, sash locks, sash balances, window fixtures, lock washers and nut locks. Represented by F. B. Archibald, W. C. Dodd, Daniel Hoyt and John B. Seymour.

National Malleable Casting Company, Cleveland, Ohio.—Tower, Climax and Sharon couplers. Represented by F. R. Angell, C. A. Bieder, W. E. Coffin, J. V. Davison, R. T. Hatch, H. D. Hammond, J. H. Jaschka, K. R. Johnston, G. V. Martin, B. Nields, Jr., R. H. Pilson, J. A. Slater, S. L. Smith, E. O. Warner and L. S. Wright.

National Tube Company, Pittsburgh, Pa.—Seamless steel locomotive tubes, Spellerized locomotive tubes, seamless steel locomotive bells, seamless tubes for mechanical purposes, Kewanee unions, valves and air pump unions. Represented by Geo. N. Riley, L. R. Phillips and James C. Bateman.

Newton Machine Tool Works, Inc., Philadelphia, Pa.—High duty radial drilling machine; cold saw cutting off machine; rapid production bolt threading machine. Represented by Harry W. Champion and Nicholas P. Lloyd.

New York Air Brake Company, New York, N. Y.—Exhibition rack, showing operation of latest improved brake equipment for locomotive, tender and a passenger train of eight cars, illustrating the new J triple valve for passenger cars, and the L T equipment for all kinds of locomotives; also air signal equipment and the Forsythe automatic coupler. Represented by H. F. Bickel, N. A. Campbell, Wm. Owens, G. O. Hamond, W. T. Henry, C. P. Lovell and Geo. Kleifges.

Newhall Engineering Company, George M., Philadelphia, Pa.—N. B. air-brake and signal hose connection, photographs showing products of Industrial works of Bay City, Mich.; Pablow pneumatic tool appliances, throttle handles, hose couplings, air valves, etc. Represented by W. L. Brown, M. L. Newhall and David Newhall.

Niles-Bement-Pond Company, New York.—This exhibit includes also an exhibit of the Pratt & Whitney Company.—Pond rigid turret lathe; single screw tool clamp for Pond car wheel lathe; P. & W. 16-in. precision lathe for toolroom use; P. & W. high speed twisted drills. Represented by J. K. Cullen, J. T. McMurray, D. J. Normoyle, G. F. Mills, F. G. Payson, E. L. Leeds, N. C. Walpole, E. S. Cullen, D. H. Teas and M. Estabrook.

Norton Company, Worcester, Mass.—Large wall case of Norton grinding wheels made of alundum; large wall case of India oil stones. Represented by Geo. C. Montague.

Norton Grinding Company, Worcester, Mass.—Norton gap grinding machine for locomotive work, 18 in. and 30 in. x 96 in.; samples of automobile crank-shaft ground on a Norton grinding machine; pair of car wheels illustrating a flat wheel and a wheel ground on a Norton car wheel grinder. Represented by Hans Wickstrom.

Noscalon Company, New York, N. Y.—Noscalon material and machine for introducing material into locomotive boilers and machine for introducing material into stationary boilers. Represented by Wm. H. Stevens, John J. Healey, Jr., Robert T. Weaver and Frank H. Clark.

Pantasote Company, New York, N. Y.—Pantasote car curtains and upholstery materials; Agosote head linings, panels, partition, etc. Represented by John M. High, Geo. N. Boyd and Wm. O. Lake.

Parkesburg Iron Company, Parkesburg, Pa.—Knobbled hammered charcoal iron boiler tubes, safe ends, arch tubes and water grates. Represented by H. A. Beale, Jr., G. Thomas, 3d, C. L. Humpton, J. A. Kinkead, W. H. S. Bateman and L. P. Mercer.

Pilliod Company, Swanton, Ohio.—Two models of Baker-Pilliod locomotive valve gear. Represented by R. H. Weatherly, Frederick E. Pilliod, Charles J. Pilliod, Henry J. Pilliod and F. S. Wilcoxen.

Pittsburgh Equipment Company, Pittsburgh, Pa.—Side frame, journal boxes, draft casting, body bolster and structural truck bolster. Represented by H. V. Seth and O. S. Pulliam.

Pocket List of Railroad Officials, New York, N. Y.—Pocket list of railroad officials. Represented by J. Alexander Brown and Chas. L. Dinsmore.

Pratt & Whitney Company, New York, N. Y.—With Niles-Bement-Pond Company.

Pressed Steel Car Company, Pittsburgh, Pa.—Photographic reproduction of product in booth 515. Represented by O. C. Gayley, J. S. Turner, C. E. Postlethwaite, J. H. Mitchell, L. O. Cameron, F. von Hiller, J. H. Regan, W. H. Wilkinson, F. M. Robinson, J. G. Bower, C. D. Terrell, V. von Schlegell, G. H. Glover, Jr., M. S. Simpson, C. D. Jenks and G. T. Merwin.

Queen City Machine Company, Cincinnati, O.—One 24-in. motor-driven shaper, with gear box and a Westinghouse recording watt meter in operation. Represented by Mark Muggeridge and A. M. Watcher.

RAILROAD AGE GAZETTE, New York, N. Y.—Represented by William H. Boardman, Edward A. Simmons, Ray Morris, Frank S. Dinsmore, Lucius B. Sherman, John N. Reynolds, Cecil R. Mills, Henry Lee, S. O. Dunn, William Forsyth, Bradford Boardman, Francis E. Lister, Charles H. Fry, Francis W. Lane, William H. Horton, Harold D. Horton, M. Davis, C. E. Crossman, A. B. Weaver and J. C. Marriott.

Railway Business Association, New York, N. Y.—No exhibit. Represented by Geo. A. Post, Frank W. Noxon and George A. Post, Jr.

Railway List Company, The, Chicago, Ill.—Monthly Official Railway List and Railway Master Mechanic. Represented by W. E. Magraw, C. S. Myers, L. F. Wilson and Warren Edwards.

Railway Materials Company, Chicago, Ill.—Steel back brake-shoes for locomotive, car and electric service. Ferguson oil furnaces, Rymco journal boxes. Represented by W. M. Simpson, Geo. L. Bourne, C. M. Mendenhall, T. B. Cram and Geo. Hoeffle.

Rapp, John W., New York, N. Y.—Steel doors.

Revolute Machine Company, New York, N. Y.—Continuous electric blue-print machine. Represented by J. V. McAdam, C. J. Everett and T. W. Holcomb.

Ritter Folding Door Company, The, Cincinnati, Ohio.—Model Ritter folding door, constructed of wood and glass as used in roundhouses and machine shops. Represented by T. N. Motley, F. A. Barbey, W. Moore Wharton, W. C. Lawson and J. M. Crowe.

Robinson Company, Boston, Mass.—Robinson exhaust nozzle, rail anchor, air strainer. Represented by Gordon Dexter, Frederic Parker, Frank Robinson and Charles L. Snow.

Royersford Foundry & Machine Company, Inc., Royersford, Pa.—Punch and shearing machines. Represented by G. C. Freed and A. Loomis.

Rubberset Brush Company, Newark, N. J.—Paint brushes set in rubber, adapted for railway use. Represented by A. L. Holtzman and Wm. R. Wright.

Russell, Burdsall & Ward Bolt & Nut Company, Port Chester, N. Y.—Finished and semi-finished castellated nuts; semi-finished hexagon nuts; finished case hardened nuts; cold punched chamfered and trimmed nuts; monel metal bolts and nuts; machine bolts and bolts for all classes of work for engines and cars. Represented by R. B. M. Cook and T. S. Hickox.

Ryerson & Son, Joseph T., Chicago, Ill.—Lennox rotary bevel shear, Ryerson high-speed friction saw, portable automatic key-seating machine, crank-pin truing machine, flue welding machine, Hartz flue welding machine, model of the Ryerson flue-cleaning machine, boring bar, improved riveter, Ryerson high-speed chain hoist and trolleys, valve seat facing machine, glyco-lined M. C. B. standard car journal bearings. Represented by G. H. Pearsall, E. T. Hendee, J. Kunzer, M. C. White and O. C. Duryea.

Safety Angle Cock and Air-Brake Hose Coupler Company, Baltimore, Md.—Safety angle cock and air-brake hose coupler. Represented by John C. Hooper.

Safety Car Heating & Lighting Company, New York, N. Y.—Latest type single mantle lamps; axle-driven dynamo electric lighting equipment; lighting fixtures; demonstration of vapor lighting equipment for branch line service; and the Safety heating system for passenger trains. Represented by R. M. Dixon, J. A. Dixon, L. R. Pomeroy, R. C. Schaal, G. E. Hulse, J. S. Henry, Wm. St. John, D. W. Pye, J. M. Town, R. C. Moore and C. B. Adams.

St. Clair Air-Brake Company, Indianapolis, Ind.—Two air-brakes. Represented by Augustus A. St. Clair and Newton Claypool.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo.—All open-hearth steel castings, consisting of body and truck bolsters, side truck frames, excel couplers, engine frames, car and tender underframes, driving wheel centers and miscellaneous car and locomotive castings. Represented by Harry Scullin, Thos. M. Gallagher, C. L. Harris, W. W. Pettis, P. J. Howard, J. O. Timms, F. W. Graves, F. L. Norton and R. B. Clark.

Scully Steel & Iron Company, Chicago, Ill.—Everlasting blow-off valves, Simplex car and track jacks, homo-laminated staybolts, Wangler rotary bevel shear, Scully rotary plate shear, Lucas pneumatic tube expanders, Scully railway flue cutter, reversible staybolt chuck, Scully journal jacks, Scully wrought steel floor plate, Scully hose couplings and boiler shop tools. Represented by A. B. Scully, H. C. Finlay, W. H. Dangel, W. B. Templeton, A. E. Barron, John H. Allen, F. M. Patterson and H. H. Gilbert.

Sellers & Company, Wm., Incorporated, Philadelphia, Pa.—Locomotive injectors and valves. Represented by S. L. Kneass, J. D. McClintock, C. B. Conger, Geo. H. Wilson, Chas. T. Wilson and Edwd. L. Hölljes.

Standard Coupler Company, New York, N. Y.—Standard steel platform; buffing mechanism; Sessions-Standard friction draft gear; Standard slack adjuster; Standard sustaining valve for air brake cylinders. Represented by Geo. A. Post, A. P. Dennis, E. H. Walker, R. D. Gallagher, Jr., George A. Post, Jr., and W. H. Sauvage.

Standard Steel Car Company, New York, N. Y.—Forged steel wheels. Represented by James B. Brady, R. L. Gordon, H. G. Macdonald, Wm. A. Libkeman and C. W. Wright.

Standard Steel Works Company, Philadelphia, Pa.—No material but occupying spaces in booth. Represented by H. de H. Bright, Charles Riddell, C. H. Peterson, E. B. Halsey, H. W. Sheldon, F. Weston, G. F. Jones and E. S. Lewis.

Standard Tool Co., The, Cleveland, Ohio.—Twist drills; reamers; taps; milling cutters, and chucks. Represented by F. T. McGuire.

Sterling Steel Foundry Company, Pittsburg, Pa.—Sterling automatic car coupler. Represented by H. E. Wainwright and G. J. Chandler.

Stoever Foundry & Mfg. Co., New York, N. Y.—One No. 2 motor-driven automatic pipe-bending machine, capacity 1 in. to 2 in.; one No. 8 motor-driven pipe-threading and cutting-off machine, 1909 model, capacity 2½ in. to 8 in. Represented by Ed. R. Euston and W. E. Farrell.

Storrs Mica Company, Owego, N. Y.—Samples of mica headlight chimneys and other styles of mica lamp chimneys. Represented by A. P. Storrs and Charles P. Storrs.

Symington Company, T. H., Baltimore, Md.—Malleable iron freight journal boxes, Symington iron passenger journal boxes, Symington flexible dust guards and miscellaneous malleable iron castings. Represented by T. H. Symington, J. F. Symington, C. J. Symington, T. C. deRosset, A. H. Weston, D. Symington and W. W. Rosser.

Taylor Company, W. P., Buffalo, N. Y.—Taylor improved dustproof self-locking journal boxes for freight and passenger service. Represented by W. P. Taylor, Jas. W. Gibney, A. L. Kendall and Wm. C. Wilson.

Taylor Mfg. Company, James L., Bloomfield, N. J.—Quick adjusting and self-locking screw clamps. Represented by James L. Taylor and E. C. Blake.

Tindel-Morris Company, Eddystone, Pa.—High-duty cold sawing machine and inserted teeth high-speed steel saw blades.

Topping Brothers, New York, N. Y.—Burrows ball-bearing jacks and Burrows cone-bearing jacks. Represented by W. R. Burrows, W. C. Burrows, Edward Dugan, W. T. Goodnow, W. B. Kilpatrick and H. W. Topping.

Underwood & Co., H. B., Philadelphia, Pa.—Portable cylinder boring bar, portable crank-pin returning machine, new portable crank-pin rivet head facer, portable rotary boiler tube cleaner and a new vertical machine for boring small cylinders, such as air-brakes, etc. Represented by A. D. Pedrick and D. W. Pedrick, 2d.

Union Draft Gear Company, Chicago, Ill.—The Cardwell friction draft-gear. Represented by J. R. Cardwell, John D. Ristine, C. H. Tobias and W. G. Krauser.

Union Fibre Company, Winona, Minn.—Linofelt refrigerator car lining; special fire and waterproof lith for lining steel cars. Represented by A. G. Brown, J. H. Bracken, F. J. Bingham and S. E. McPartlin.

Union Spring & Manufacturing Company, Pittsburgh, Pa.—Coil and elliptic springs; pressed steel journal box lids and spring plates; Kensington all-steel journal box. Represented by A. M. McCrea, L. G. Woods, C. S. Foller, A. Stucki, T. B. Arnold and A. C. Woods.

U. S. Metal & Manufacturing Company, New York, N. Y.—Ideal automatic car coupler; Peerless cast steel bolster; Feasible drop brake staff; Columbia lock nuts; Davidson locomotive raiser; Hutchins car roof; Detroit car door; Howard wrought iron brake jaw; Western malleable iron brake jaw; Hillman locked clevis and turnbuckle; Diamond tapered steel pole; St. Louis Surfacer and Paint Co. panels; Exhibition car on track equipped with Dunham hopper door device; Columbia lock nut; Ideal car coupler; Feasible drop brake staff. Represented by B. A. Hegeman, Jr., G. L. L. Davis, E. D. Hillman, Arthur Masters, Fred Atwater and A. E. Williamson.

Ward Equipment Company, New York, N. Y.—Ward's complete heating equipment for railway cars and locomotives, improved locomotive reducing valve, starting valve, steam couplers, end train line valves, steam traps and low-pressure attachment, passenger car ventilator, Ward's yard plug, used for charging storage batteries on electrically lighted cars. Represented by John E. Ward, Alfred W. Kiddle, George B. Culver and Richard Voges.

Watson Insulated Wire Company, New York, N. Y.—With the Kerite Insulated Wire & Cable Company. Represented by J. V. Watson.

Watson Stillman Company, New York, N. Y.—Hydraulic car wheel and crank-pin presses, hydraulic rail benders and jacks, turbine pumps. Represented by G. L. Gillon, Richard Baker and H. A. Prindle.

Watters, J. H., Augusta, Ga.—Strainer valves, track sanders, cushion cleaners, truck wheels. Represented by J. H. Watters.

Waugh Draft Gear Company, Chicago, Ill.—Draft gears and truck springs. Represented by J. M. Waugh and D. MacFarland.

Welsbach Company, Gloucester, N. J.—Incandescent gas lamps for railway station yard and shop lighting, incandescent gas mantles. Represented by Chas. W. Wardell, Townsend Stites, Thos. J. Litle and Milton C. Whitaker.

West Disinfecting Co., Inc., New York, N. Y.—Soap dispensers, disinfectants, disinfecting appliances for toilet rooms, fumigating apparatus. Represented by E. Taussig and Geo. L. Lord.

Western Railway Equipment Company, St. Louis, Mo.—Republic friction draft gear; Acme automatic brake slack adjuster; combination lug and follower casting; interchangeable door; Western flush car door; slack adjuster; Downing card holder; Linstrom non-freezing suction pipe; Acme pipe clamps; Western angle cock holder; Western sill pockets; Western tie dating nails; St. Louis door; bell ringer; Missouri door; Security dust guard; Linstrom eccentric; Hoerr fish hook tie plates; brake jaws and brake jaw pins. Represented by S. H. Campbell.

Western Steel Car & Foundry Company, Chicago, Ill.—With the Pressed Steel Car Company and the same representatives.

Western Tool & Manufacturing Company, Springfield, Ohio.—Toolholders, many new designs of machinists tools; Champion expanding mandrels, movable benches. Represented by Henry Morris and J. Z. Wells.

Westinghouse Automatic Air & Steam Coupler Company, St. Louis, Mo.—Sample of their automatic air and steam coupler. Represented by N. F. Niederlander and E. L. Adreon.

Westinghouse Air-Brake Company, Pittsburgh, Pa.—Triple valve test rack operative centrifugal dirt collector and sectioned (demonstration); 8½-in. cross compound air compressor connected in tandem with sectioned pump, demonstrating operation; rack demonstrating operation of K-2 triple valve (sectioned); enameled main reservoirs; motor-driven air compressor; "hose protecting" couplings; annealed steel hose clamps; demonstration of force required to separate hose couplings between cars as compared with standard hose couplings. Represented by A. L. Humphrey, J. R. Ellicott, E. L. Adreon, E. A. Craig, W. V. Turner, C. F. Street, A. Johnson, H. F. Woernley, G. L. McIntyre, H. C. Donaldson, C. C. Farmer, F. V. Green, W. S. Bartholomew, C. J. Olmstead, F. T. Reese, S. J. Kidder and P. H. Donovan.

Wheel Truing Brake-Shoe Company, Detroit, Mich.—Abrasive brake-shoes for truing up flat wheels, dressing down tread worn tires and long flanges. Represented by J. M. Griffin.

Wickes Boiler Company, Saginaw, Mich.—The Wickes vertical water tube safety steam boiler. Represented by C. F. Wilson and L. Beebe.

Winslow Company, Horace L., Chicago, Ill.—Clark blow-off system; two-in-one journal bearing. Represented by H. L. Winslow, W. C. Smith and H. A. Varney.

Wood, Guilford S., Chicago, Ill.—Wood's flexible nipple end hose protector, the monogram bracket, P. & W. hose preservative, upholsterer's leather, copper ferrules, car heating hose. Represented by Guilford S. Wood, D. F. Jennings and J. C. Stuart.

Wood Locomotive Fire Box & Tube Plate Company, W. H., Media, Pa.—Samples of flanging and pictures of boilers and fire boxes. Represented by William H. Wood, F. H. Snell and William T. Kolp.

Yale & Towne Manufacturing Company, New York, N. Y.—Electric hoists, Triplex chain blocks, I-beam trolleys, electric triplex hoists, padlocks, door checks, night latches, builders' hardware. Represented by C. W. Beaver and C. H. Van Winkle.

TATE FLEXIBLE STAYBOLT.

Locomotives equipped largely with the Tate flexible staybolt, made by the Flannery Bolt Co., Pittsburgh, Pa., have been running over three years with no staybolt breakage, where bolts are installed properly, no side sheets cracking and no engine time lost, due to staybolt repairs. The saving of time incidental to taking like engines out of service for the purpose of renewing broken rigid staybolts more than pays for the flexible staybolt investment, regardless of the cost necessitated by reason of dismantling and reassembling a large portion of the back end covering and boiler attachments, in order to remove and renew broken rigid staybolts, an item which in the aggregate is too large to be overlooked and should be eliminated. The maker claims that if provision is made for flexible connections to firebox by the use of the Tate flexible staybolt, in locations where expansion is greatest, and the Tate bolts are adjusted to allow for the difference of expansion between the outer shell and firebox, staybolt breakage, fire sheet cracking, and flue and seam leakage will be largely if not entirely overcome, thereby raising the earning value and lowering the cost of maintenance of the locomotive, as an earning factor. This is all being accomplished by customers who first took up the Tate flexible staybolt and gave it careful consideration.

METAL CUTTING BY OXYGEN.

Of particular interest to railway engineers is the demonstration plant which the Linde Air Products Co., Buffalo, N. Y., will have in operation during the convention at the ocean end of the pier. Further samples of work may be seen at the exhibit at booth No. 210 in the convention hall.

During the last few years, oxygen has come very prominently into use for the purpose of cutting wrought iron and steel plates and structures of all sorts. The process is based on the well-known fact that a jet of oxygen directed upon a previously heated spot of metal ignites it, with the result that the metal, acting as its own fuel, burns away rapidly in the form of iron oxide.

The appliances used for this work are of various designs, but are identical in principle. They all consist essentially of a blowpipe with an additional passage through which an independent and separately controlled stream of oxygen is supplied at the discretion of the operator. This separate supply of oxygen may be conveyed through the center of the blowpipe, in which case the mixed gases employed for heating are conducted through an annulus surrounding it, or the supply may be brought in a passage immediately behind the heating flame. There does not appear to be much to choose between these arrangements. The object of each is to preheat to incandescence the spot on which the jet of oxygen is afterwards caused to impinge, and then to maintain that heat while the oxygen jet is operating on the metal.

Strictly speaking, once the metal is ignited and the jet in operation an auxiliary source of heat ought not to be required. It is, however, found difficult in practice to maintain with certainty the combustion of metal in the oxygen jet owing to unsteadiness in manipulation on the part of the operator, and to particles of oxide striking and momentarily blocking the orifice of the jet. This difficulty is overcome by the simple expedient of maintaining the heat jet in operation while the cutter is traveling, so that it is always available for the supply of the necessary heat to ensure continuous combustion of the metal in the stream of oxygen.

The cutting operation is very simple and can be mastered by any intelligent workman in a few hours. The edge or surface of the plate at the point to be cut is first heated by the mixed jet of oxygen and any suitable combustible gas. When this spot has been brought to a state of incandescence, a fine cutting jet of oxygen is discharged upon it. This immediately produces combustion of the metal, with the resulting formation of iron oxide. The jet of oxygen is made sufficiently strong to blow away this iron oxide in front of it, with the result that a clean narrow cut is effected through the metal at a speed of travel which is comparable with hot sawing. The metal on each side of the cut is neither melted nor injured in any way, as the action proceeds too rapidly for the heat to spread; in fact, the edges present the sharp and clean metallic surface of a saw cut.

The cutting may be made to follow any desired line, executing circles, curves, or profiles as desired, for which purpose guides and other accessories are usually provided, or can be readily constructed. Bevel cuts can also be made. The process can be employed for cutting all grades of steel; the action being chemical rather than mechanical, the quality of the metal does not materially affect the results.

In fact, its applications are unlimited, and it is a handy, portable tool for which, unlike the welding blowpipe, no special, prolonged training is required.

Cutters are now for the most part constructed to work optionally with coal-gas or acetylene as the combustible gas for heating. For new or clean metal, coal-gas will be found preferable, both from the point of view of economy and quality of work. On the other hand, for the cutting of all scaled, oxidized or inaccessible structures the superior heat of the oxy-acetylene flame will be found to greatly facilitate and quicken the work done by the cutter.

In addition to the hand apparatus, special machines are on the market for cutting pipes, circles, ellipses for manholes in boilers, and other shapes common in engineering experience.

There are also special appliances in use for ensuring a steady movement of the cutting nozzle, a matter of considerable importance where neat and accurate work is desired. New appliances are constantly being devised with the object of extending the application of the process and of improving the results obtained.

THE FERGUSON DOUBLE BULLDOZER FURNACE.

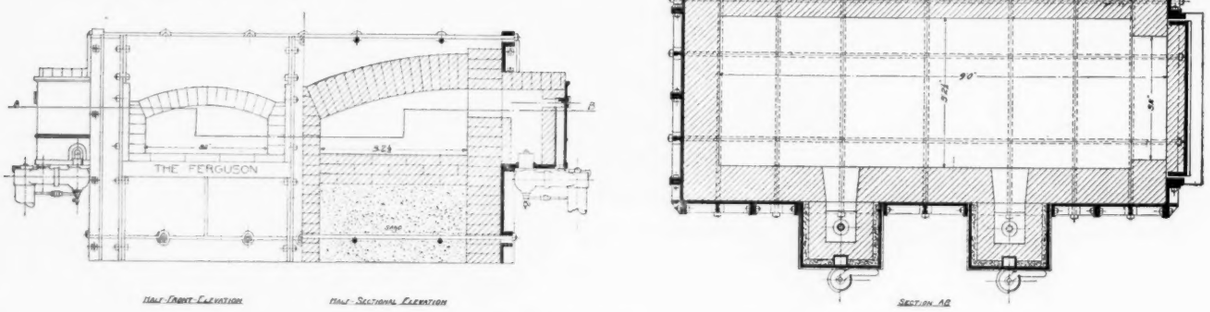
Long experience with furnace requirements has enabled the builder of the Ferguson furnaces to meet the needs of the modern railway blacksmith shop and forge, and to do it with the least expenditure for fuel. In the Ferguson furnace the air is not atomized; it is carbureted in the combustion chamber, and by this means an intensely hot, dry flame is produced in the furnace proper. The combustion is perfect and an analysis of the waste gases passing off from the furnaces has shown that the heat values in the air have been given up to the material in the furnace and not to heating the shop by radiation. No compressed air is used with the Ferguson system, and this feature in itself results in the economic operation in contrast with those furnaces where the air is atomized by compressed air at high pressure. Every pound of oil requires a certain amount of oxygen to complete combustion, and the economy in supplying this oxygen is an important item. The fan blast as used in the Ferguson system is not only better practice but it is cheaper than compressed air, as the latter must expand before combining with the oil for combustion. The fan blast of 8 oz. pressure and an oil supply of from 5 to 10 lbs. is all that is required in the Ferguson system. The quality of the gas in the Ferguson furnaces is such that there is a minimum amount of oxygen in the heated metal, and this is a very important item, as the oxidized scale causes more wear and tear on machinery dies than any other one thing. There is also the disadvantage of the lost weight of metal where excessive oxidation occurs.

The double bulldozer furnace here illustrated is especially useful in car shops. Each compartment is 3 ft. 2½ in. x 9 ft., inside. In shops where large quantities of arch bars or like

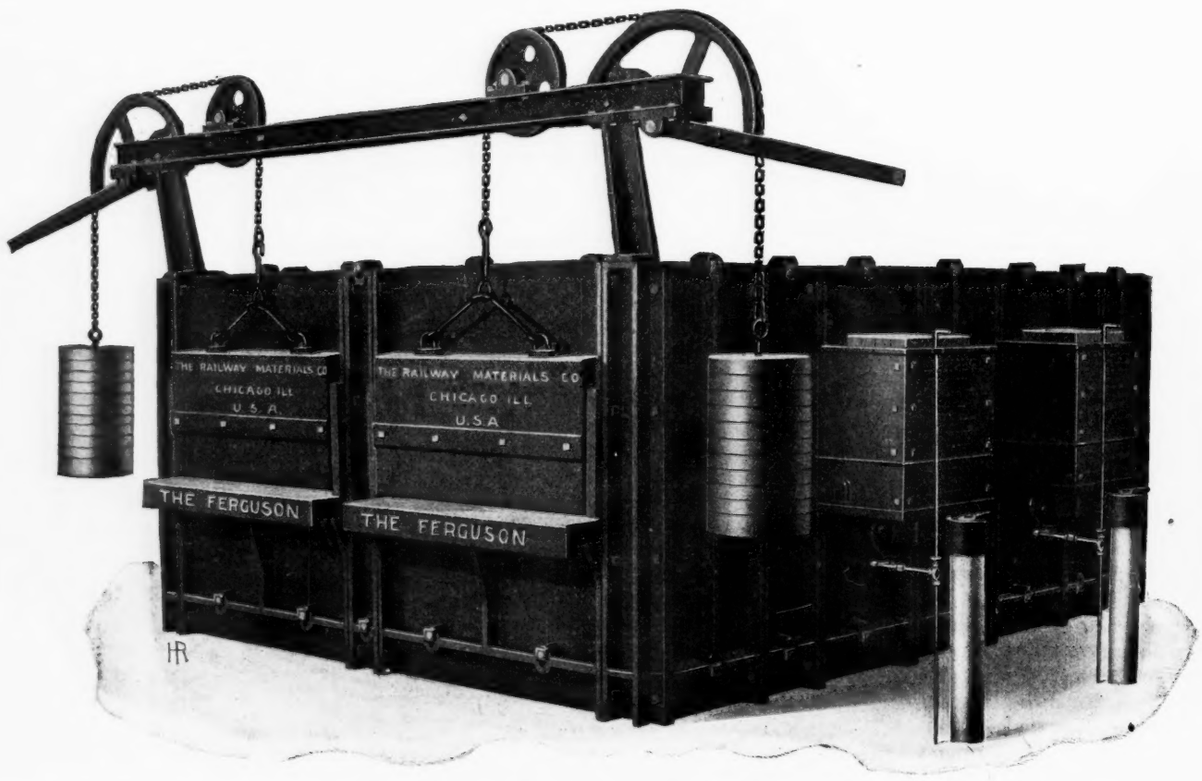
material are required for new trucks, the arrangement of the bulldozer furnace with two heating compartments is recommended. These double bulldozer furnaces are manufactured in several widths and lengths, according to the requirements of the purchaser. The advantage of the double bulldozer furnace is that a maximum out-put is obtained, as one compartment can be charged and brought to the proper temperature while the material in the other chamber is being formed in the bulldozer. A smaller bulldozer furnace made by this company is 3 ft. x 9 ft. inside and is of sufficient length for arch bars and parts of passenger trucks and the usual shapes found in a car shop. Where short heats are desired, it is only necessary to use the front combustion chamber, and if necessary this furnace can be supplied with a door at each end.

Among the smaller furnaces made by this company there is the No. 4 forging furnace for heavy work, and used in connection with small drop hammers, up to 1,200 lbs. A smaller forge furnace, No. 2, is designed to heat the material for the Bradley hammer work, and has the front arranged for work similar to the welding of brake lever jaws. It can be arranged so that work can be taken from both sides of the furnace, or longer material can be run right through, thus making it possible to take either end or center heat on wide material. The company supplies two kinds of rivet furnaces, one for work with machine riveters and installed to heat for several gangs using pneumatic hammers. It is arranged so that the rivets can be taken from either or both sides of the furnace. The other rivet furnace is made for steel car shops where large quantities and various sizes of rivets are required. This furnace has a capacity to heat for four gangs of riveters.

These furnaces are made by the Railway Materials Co., Chicago.



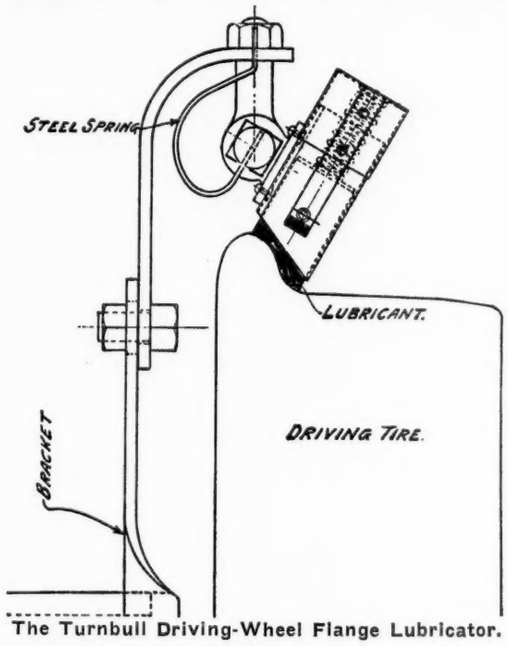
Ferguson Double Bulldozer Furnace.



Ferguson Double Bulldozer Furnace.

THE TURNBULL DRIVING WHEEL FLANGE LUBRICATOR.

Driving wheel flange lubricators are among the most interesting devices which have come before the railway public in recent years, as flange wear is something that has puzzled railway men in their effort to keep down the cost of maintenance. The device here illustrated is very simple and it is attached to the frame of the engine and so adjusted as to bring the lubricant in contact with the flange with a uniform pressure at all times. Several tests made by one of the large roads show it to be thoroughly practicable. While it lubricates the flange it does not allow the lubricant to spread over the tread of the wheel, thereby causing slipping. This drawback to all flange lubricators heretofore offered, has been their principle objection. The lubricant used in this device is of a hard consistency so that while it performs the work intended,



The Turnbull Driving-Wheel Flange Lubricator.

the constant action of the flange on the compound does not unduly consume it. When once the flange is coated with the compound, unless the flange comes in contact with the rail on curves, thereby communicating the lubricant from the flange to the inside of the rail, there is practically no demand being made by the flange on the compound. The results obtained thus far by one road in a year's trial show that the flange wear has been reduced one-half at least. During this year's work the device has been used on an engine through snow and ice, which, of course, is under the most trying condition. This device is for sale by the National Railway Devices Company, 400 Old Colony Bldg., Chicago, and is on exhibition at booth 319, Young's Million Dollar Pier.

MANGANESE STEEL GEARS AND PINIONS.

Inasmuch as the steam roads are becoming interested in electric traction matters it may not be amiss to call attention to the samples of manganese steel gears and pinions in the exhibit of the Atha Steel Casting Co., Newark, N. J. Manganese steel castings are economical wherever excessive wear is likely to occur, as in rock and coal crushers and pulverizers, frogs and crossings, bushings, parts of dredging machinery, mining machinery, etc. Gear makers have been trying for years to obtain a material that would withstand the excessive wear on railway motor gears and pinions. They have made pinions of high carbon, chrome and other special forged steels, and gears of tempered steel and high carbon rolled steel. The service obtained from the gears and pinions made by the various processes and different grades of steel above enumerated falls far below the mileage and life of the manganese steel gears and pinions when run in combination. It is claimed that the Titan gears and pinions will (when operated together) run at least five times as long as any other steel gears and pinions. A great saving is effected by use of Titan gears and pinions by giving greater mileage, avoiding necessity of removal of wheels to replace gears, as they will wear longer than any car wheel. The Atha Steel Casting Co. experimented many years on manganese steel for gears and pinions, with the result that they produced gears and pinions successfully. The thousands in use by the electric roads is evidence of the success of the Titan gear and pinion. Besides being applicable to electric railway work, they are economical for electric traveling cranes and in fact wherever gears and pinions are used which are subject to severe strain and wear.

NEW STEEL PASSENGER CARS FOR THE C. R. I. & P.

Passenger cars of all-steel fireproof construction or those of part-steel slow-burning construction are no longer an experiment, still each car built represents something new in design. The Chicago, Rock Island and Pacific new steel passenger equipment, and that of the St. Louis & San Francisco, as designed by the American Car & Foundry Company, New York, subject to approval in important parts by W. A. Nettleton, Genl. Supt. of Motive Power, and C. A. Seley, Mech. Engr., 140 of which are now under construction at the Jeffersonville plant of the car builders, are no exception, and while the car described is a passenger coach, the main features of the design are common to all. Safety to the passenger in the event of collision; repairs easily effected—in cars damaged—strength of fabric, together with lightness of construction, were the results sought and obtained. Safety, because the platform and buffer end sills secured to ends of longitudinal sills and having a steel plate riveted to their upper flange and the flanges of platforms and center sills, together with the platform plate, which is riveted to the sills and extends back, and is riveted to the body end sill, form a very efficient anti-telescoping device. This and the fact that the body end posts and vestibule diaphragm posts are so made that they must be sheared entirely off before one car can enter another make the chance of injury to passengers very slight. The possibility of repairs being needed, and if so, easily effected, has been carefully worked out in every part of the car, and especially so at the ends where the use of double carlines permits the hood being easily removed for repairs, and a carefully worked out arrangement of bracing in the hood is intended to take care of any pressure that may be brought upon it. Strength and lightness are both made possible by making the side of the car in the form of a double plate girder designed to carry the entire load of the car, including the deadweight of the superstructure without undue deflection, leaving to the center sills, which are 10-in. 35-lb. I-beams, the buffing and pulling stresses only. Four cross bearers maintain the perfect alinement of the center sills and transmit the load to the side girders. The lower chord of the girder or side sill proper is a 6-in. x ¾-in. angle fastened between the outside $\frac{5}{16}$-in. sheathing plate and the lower ends of the side posts which are offset around the angle. The upper chord is a 5-in. x 4-in x ¾-in. angle reinforced with a 4-in. steel bar on the inside of the angle, and a 4-in. steel bar placed outside the upper edge of the side girder plate, all thoroughly riveted together and the web (side sheathing plate) reinforced by riveting side posts thereto. The inner girder, formed of a $\frac{5}{16}$-in. steel plate, which is also the wainscot, having vertical reinforcing ribs pressed in, and a 3½-in. x 3½-in. x $\frac{11}{16}$-in. reinforcing angle at its upper and a 3½-in. x 3½-in x ¾-in. reinforcing angle at its lower edge. The lower flange of the side girder rests directly upon the transverse floor beams and cross bearers, which in turn rest upon and are secured to both horizontal and vertical flanges of the side sill angles. The side sheathing, forming as it does part of the side girder, is riveted directly to the angles and tees forming the one-piece posts, ex-

tending from sill to plate, which latter is an angle that extends full length of body of car in one piece. Body end sills formed of flanged steel diaphragms applied in pairs with posts between and riveted to web, and having a steel channel tension member extending across below sill and platform beams, and then brought up and riveted to web of diaphragm taken in conjunction with the top member, which also forms platform flooring, gives a particular strong construction.

The roof, of $\frac{1}{16}$-in. steel on the side deck and $\frac{3}{32}$-in. on the upper, riveted directly to the carlines, and all joints covered with a splice plate and welded securely, gives a thoroughly watertight construction, as is also secured on the sides by means of brazed or welded joints.

The flooring is of light steel sheets riveted to floor support angles and covered with asbestos insulation; on top of this keystone section flooring with a top covering of Acandlith cement flooring $\frac{5}{8}$ in. thick, laid in sections separated by narrow strips to avoid cracking due to vibration of car.

The interior, from sash cap to plate over basket rack, is handsomely finished in Mexican mahogany, and all specialties are the railway company's regular standard, as is also the arrangement of saloons, fittings and general interior arrangement of car.

Special attention has been given to this design so that the car may be built in all steel or part steel, as desired, without changing any important parts of the car and with a difference of but 2,000 lbs. in the weight.

General dimensions of the car are as follows:

Length over body end sills	70 ft. 1 in.
Length inside	69 ft.
Distance, center to center trucks	54 ft. 1 in.
Length over buffer face plate	80 "
Width over side sills	10 " 3 "
Width over eaves molding	10 " 4¼ "
Width inside between wainscot	9 " 2⅝ "

CONSOLIDATED CAR-HEATING COMPANY'S VAPOR HEATING SYSTEM.

In any steam heating system for railway use, the factor most desirable is flexibility of operation. That is, the control of the temperature of the radiating pipes should permit of maximum variations, which will be maintained automatically after the trainman has set the system for a given temperature. In a straight pressure system, which is operated in mild weather, the steam pressure will gradually accumulate in the radiating pipes and will either necessitate their being blown out as at the blow-off valve to prevent over-heating, or else the inlet valve must be opened for very short periods, which entails careful attention on the part of the trainman. On the other hand, a straight vapor system, on account of the elementary characteristic that the pipes can never exceed a temperature of 212 deg., must provide enough radiating surface to maintain the car at the proper temperature in the most severe weather. In other words, a straight vapor system cannot be forced beyond a certain limit. A combination of the two systems would give ideal conditions throughout any temperature conditions, for the following reasons:

First, the piping provided, i.e., the radiating surface, will not have to be for extreme weather conditions, but for an average as in extreme weather pressure can be admitted to the pipes to bring up their temperature.

Second, in mild weather and the average weather, the vapor system will be entirely adequate for heating the car with the normal amount of piping, thereby not only economizing on the initial cost of the pipe, but also a considerable amount of steam which would be otherwise used.

Third, overheating in mild weather is absolutely prevented, as with the Consolidated vapor system the steam can be graduated for any amount.

Fourth, with the Consolidated combination system, five gradations of heat can be obtained with the use of only two traps and no separate inlet valves in the car. They are as follows:

Vapor heat on one side of the car only;
Vapor heat on both sides of the car;
Vapor on one side and pressure on the other;
Pressure on one side of the car only;
Pressure on both sides of the car.

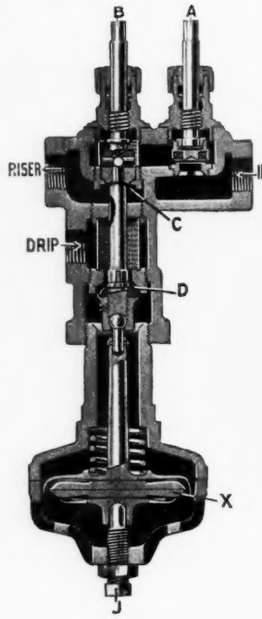


Fig. 1.

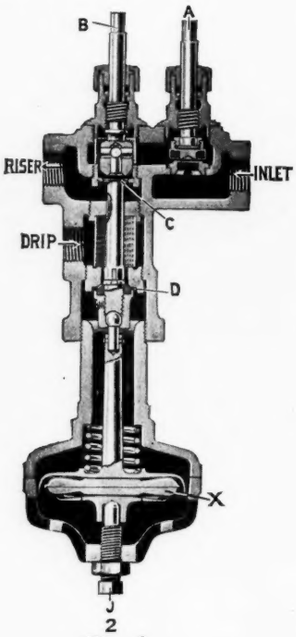


Fig. 2.

The Consolidated combination system thus gives a maximum of temperature control with a minimum of attention.

Fig. 1 shows the No. 172R trap operating as a vapor system. The steam coming in through the inlet, passes through the valve A, through the ports shown, to the valve C. From here it goes to the riser, through the radiating pipes, returning to the drip connection and passing out, after blowing on the diaphragm X. When the drip connection reaches a temperature of 210 deg., the diaphragm expands sufficiently to close the valve C, thereby shutting off the supply of steam. The valve D is positively held away from its seat, as the distance between the valves is greater than between their

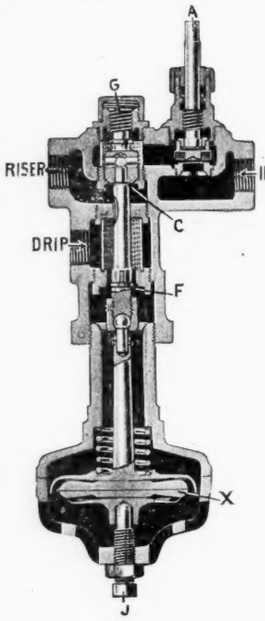


Fig. 3.

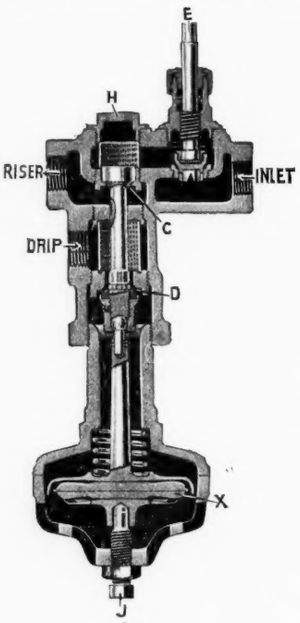


Fig. 4.

respective seats. It will thus be seen that the vapor operation is extremely simple.

Fig. 2 shows the same trap, only operating as a pressure system, the only operation necessary to obtain same being the opening of valve B. This permits of the steam flowing the same as before, with the exception that the valve D is now permitted to close, as the valve seat at C is moved upward so that the valve C cannot seat and therefore the steam continues to flow, the condensation being retained at D. It thus becomes a straight pressure system.

Fig. 3 shows the same trap, only arranged for straight vapor conditions should a railway prefer to equip its cars with sufficient piping for vapor operation in extreme weather, and the trap is then furnished as shown. It can, however, at any time, be changed to the straight pressure trap.

Fig. 4 shows the same trap, but arranged for straight pressure; it operates in the ordinary manner for straight or direct steam operation.

This trap thus permits of four different arrangements, which will be readily appreciated by railway men. To sum up, some of the features of the above system are enumerated below:

(1) When operating as vapor it is absolutely impossible for any pressure to come on the system, as the valve D cannot reach its seat.

(2) Upon opening the valve B, pressure operation is obtained immediately.

(3) If it is desired to go from pressure back to vapor, the system is bled down to atmospheric pressure immediately upon closing the valve B. This is essentially the same as blowing out a straight pressure system.

(4) The trap, containing a minimum number of parts and being arranged for vapor or pressure operation, cuts down the number of parts to be cared for in the storeroom.

This system has been in operation on various roads throughout the country and has met with most favorable comment from railway officials after severe tests.

This system is covered by patent issued April 7, 1908, applied for August 31, 1901, and the Consolidated Car-Heating Co., Albany, N. Y., is the pioneer in the use of a system of heating in which the flow of steam from the train line is controlled by a thermostat placed at the discharge end of the heating system.

W. H. WOOD'S CORRUGATED FIRE BOX.

The W. H. Wood Locomotive Fire Box Co., Media, Pa., has on exhibition at booth No. 362 samples of its corrugated fire box and tube plate. This improved fire box has been in service in three consolidation engines on the New York Central for more than six months, and the following is a report on their performance. The comparison is made with three other locomotives of the same type but with ordinary plain fire box and tube sheet. The report says that the locomotives with the corrugated fire box are better steamers and that they show some economy in coal. The beading on the tubes is just as good after six months' service as it was the day it left the Depew shops. The enginemen report that they have not had tubes leaking in eight weeks' service. There has not been a broken staybolt since the three engines were put in service. The enginemen speak with the highest praise of the working of the boiler as against those of the regular type which are not fitted with the corrugated fire box and tube plate. The coal record shows an economy of 10 to 12 per cent. with the corrugated box.

NB AIR BRAKE AND SIGNAL HOSE CONNECTION.

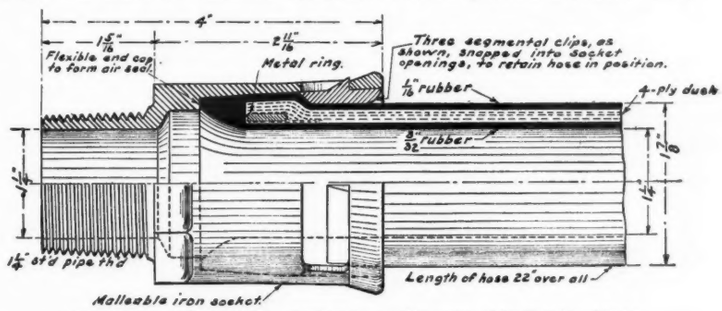
The NB air brake and signal hose connection, which is being exhibited at booth 352 by the George M. Newhall Engineering Co., Philadelphia, Pa., was designed to eliminate the large percentage of air brake hose failures, which close investigation has shown to be due to the present form of mounting.

The most important feature about the NB coupling is that it avoids all contact of the metal parts with the soft inner tube, thus allowing the inner tube to perform its function of sealing the hose structure against small leaks.

NB Hose Connection.

This device also eliminates the possibility of the hose pulling off the fitting, it being demonstrated by severe tests that in every case the hose will tear apart first.

On the other hand, these fittings can be mounted faster and more readily than the present standard, and they have the additional advantage of being practically indestructible. This is, of course, a distinct economy over the present method, where in every instance new nuts and bolts and in most cases new bands are required for each mounting.



Method of Attaching NB Connection to Air Brake Hose.

It will be seen from the accompanying cuts that the form of coupling and nipple are the same as those at present in use, so that there is no change in standard as far as the actual coupling and car fittings are concerned.

Many roads are making extensive tests of these connections, for it is certain that if they prove to be all that is claimed for them they are going to cut down the consumption of air brake hose very considerably, and thus effect a very real economy.

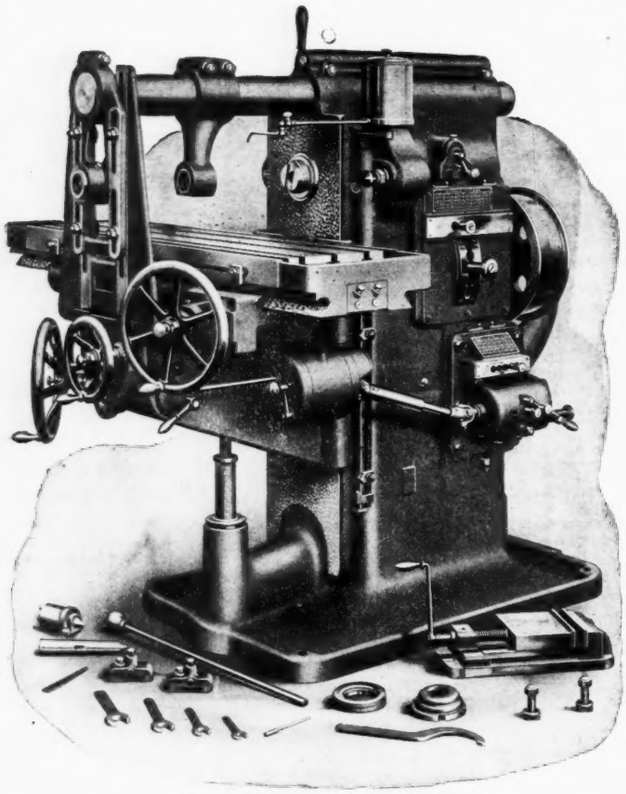
BEARING SURFACES FOR HEAVY MILLING MACHINES.

In order that a milling machine may successfully withstand the severe strains of heavy service milling, and that the finished product may be of good quality, it is of the utmost importance that the bearing surfaces of the machine be of large proportions. Furthermore, it is essential that they be placed very near the points where pressure is exerted in order to eliminate, as far as possible, all bending strains, and absorb all shocks tending to produce vibrations.

With the advent of high speed steel milling, these requirements became even more apparent, as the strains due to taking heavy cuts at fast speeds and coarse feed proved too great for bearings that formerly had been considered adequate. Therefore, in the redesigning of the cone driven machine for the application of the constant speed drive, all bearing surfaces received special attention.

The Brown and Sharpe Manufacturing Co., Providence, R. I., has always been a strong advocate of large bearing surfaces, and the design of those employed on the line of machines exhibited at the convention by this company constitute an important feature of the construction of these machines.

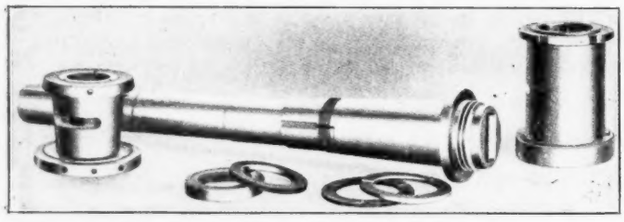
These bearings are the result of long experience and have



Brown & Sharpe Milling Machine.

been found to be most suitable to resist the severe demands of heavy service milling.

The flat bearings of the B. & S. machines are properly proportioned for heavy service, being heavily constructed and extremely wide to afford large surfaces over which to distribute the strains due to the operation of the machine. All flat bearings are accurately scraped to surface plates in order to obtain mechanically correct surfaces for the parts to move



Spindle Bearings of Milling Machine.

upon. Efficient and convenient means of compensation for wear of these surfaces are provided in all cases.

Three interesting points in connection with the flat bearings are the extension of the vertical slide to the top of the frame, thereby providing a large surface clamping attachments; the extension of the back of the knee, affording greater bearing surface on the vertical slide and adding to the rigidity of the knee, and the location of the table bearings where the greatest strains are exerted.

The spindle runs in long, heavy and correctly proportioned phosphor bronze boxes that are mounted in the heavy walls of the vertical slide and column, forming excellent examples of rigidity. The front spindle bearing is tapering, and wear is taken up by drawing the spindle back into the box. All bearings in spindle speed and feed cases are amply proportioned, bushed with bronze, and are located as near as possible to the points where the greatest strains are exerted.

The above brief descriptions plainly show the adaptability of the B. & S. machines to all classes of heavy milling.

THE RYERSON FLUE WELDING MACHINE.

The Ryerson flue welding machine consists of a heavy, substantial base on which a revolving shaft is mounted in suitable bearings. This shaft carries a driving pulley and fly wheel at one end and at the other an internal roller carrying mandrel. This mandrel much resembles the ordinary roller type of flue expander, but it is designed to roll the inside of the tube during the welding process. A steel head and arms carrying large adjustable rollers revolve with the shaft in the same vertical plane with the mandrel rollers. By pressing the foot treadle the outside roller is brought down towards the mandrel rollers until they are only separated by the thickness of the tube wall. It will be readily seen that with such an arrangement the welding must be true to gage and absolutely smooth. The adjustment is such as to make it much easier to operate than other flue welders now on the market. The advantages claimed for this approved flue welder are: First: It is driven from the pulley or motor and no air or steam is necessary to exert pressure on the welding point. Second: It is the only machine that rolls the lap of the weld on the inside.

Ryerson Flue Welder.

Rolling the weld from the inside to the outside is a new departure and one that absolutely insures a smooth weld, true to gage. Third: Possibly the greatest advantage which this machine has over others is the simple and accurate adjustment of rollers. The cold tube is placed upon the mandrel and the arms of the machine are brought down and adjusted to the thickness of the cold tube. This requires no skill and can be accomplished in less than 5 minutes. The adjustment is so perfect that the machine will roll to within a hundredth of an inch, and when once set every tube welded will be exactly the same size. Fourth: The machine is free from gears of every kind and there is little about it to wear out or get out of order. An incidental advantage is that it is the only flue welding machine that runs noiselessly: In addition to welding, the machine will scarf, spread or cut off tubes as desired. This is accomplished by simply removing the roll mandrel and substituting the proper scarf rolls, spreading device or cutting wheels. The Ryerson flue welding machine is now used in a number of the principal railway and contract shops, and is everywhere giving excellent satisfaction. The machine weighs complete 1,200 lbs. It is manufactured by Joseph T. Ryerson & Son, Chicago.

Railroad Age Gazette

DAILY EDITION

Vol. XLVI. NEW YORK—JUNE 17, 1909—ATLANTIC CITY. No. 24B.

PUBLISHED DAILY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK
On the occasion of the Annual Conventions of the Master Car Builders' and American Railway Master Mechanics' Associations.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada .....$6.00 a year
Foreign Edition, London.....£1 12s. ($8.00) a year
Single Copies.....15 cents each

If mailed from Atlantic City the postage on this copy of the *Daily Railroad Age Gazette* is seven cents. Unless the full amount is affixed to the wrapper or envelope, the post office will not forward the paper.

Application made at the Post Office at New York for entry as mail matter of the second class.

The statistics of the Swiss railways taken for the term of years from 1904 to 1907 show that there was an increase in the number of fatalities annually of 15. It is claimed that the true cause of this increase is not to be found in the increase of traffic but in almost complete suppression of the use of the whistle. The *Journal de Geneve* claims that this measure, which was taken in order to promote the comfort of passengers and of those living along the railways and in the neighborhood of the stations, is a source of constant danger to station employees who are out on the line, as well as to workmen employed in track maintenance when there is a fog, or at the exit of tunnels or in the tunnels themselves. It concludes with a demand that the use of the whistle shall be re-established. So, even in Switzerland, the lot of the railway man is not always a happy one!

The care of the painted surfaces of metals both before and after the paint has been applied is a matter that has always attracted the attention of engineers and there seems to be but one opinion as to the best practice. That consists in sand-blasting the surface before the paint is applied. With this axiom well known, it is strange that so little use is made of it. Every engineer has urged it, yet, so far as we know, only one, in the whole range of them, has put the principle into practice, at least for railway rolling stock. It has been found that tender tanks that were sand-blasted before painting had their paint in perfect condition at the end of four years, while other tanks that had been painted in the ordinary way and were run in the same service, with the same treatment, were found to need repainting at the end of eighteen months. How much longer it will be before the sand-blasted tanks will need repainting is not known, as the end is not yet. With such evidence as this at hand, and with the sentiment of the whole engineering world to back the practice, it seems passing strange that it is not used at least occasionally!

The Argentine Republic announces that it will celebrate the hundredth anniversary of its independence by an international exhibition of the transportation industries, including everything that moves by land, water or air, and does this not, to any great extent, as a competitor of foreign nations, but as a customer, open to every improvement, all capital, and all progressive men. The country already possesses some 15,000 miles of railway, likely in course of time to be quadrupled. Buenos Aires, the capital, with a population approaching 1,200,000, has some 600 miles of electric street railway, likely to be largely increased. The productions of the soil are more like those of the United States than those of any other South American country, and the rapidity of its growth can be matched only here and, of late years, in the western part of Canada. The exhibition will open May 10, 1910, and close Nov. 25—the winter of the country. Intending exhibitors are to make applications for space before June 30, 1909, addressing "*La Comision Ejecutiva de la Exposicion Internacional de Transportes, Buenos Aires.*" Exhibitors requiring power, water, gas, steam or electricity, had to apply before May 30. The president of the exhibition is the General Manager of the Argentine Railways, Dr. Alberto Schneidewind.

At the April meeting of the Pittsburgh Railway Club there was a discussion upon the uses of titanium for improving the character of the iron alloys, especially those of steel rails and cast iron wheels. Titanium is a scavenger pure and simple, and, as ordinarily used, it forms no compound with the iron and, in fact, is not to be found in the finished product. From what was said at the meeting, it seems that the wear of titanium rails is only about 35 per cent. of that of the ordinary Bessemer rails, or .55 carbon, the others having .48 carbon. The use of titanium was also advocated for cast iron wheels because it will produce closer grained metal and one free from blow holes, and therefore stronger in the rim and plates. To be sure, the percentage of combined carbon is cut down while that of the free graphite is increased. But this was said to result in a better wearing chill, though of less depth. These claims are worthy of investigation, for it is an admitted fact that titanium serves to eliminate those deleterious bodies—the oxides and nitrides in steel. But it is certainly a revelation to be told to what extent they are responsible for wear in service. It was also sated that titanium treatment made steel much less liable to rust, and this is a direct confirmation of theory and past observation in other directions. But whether all these valuable results are the direct result of the titanium treatment remains to be proven by more exhaustive investigations than any that have yet been made public.

THE CITY OF CONVENTIONS.

Atlantic City is the biggest pleasure city in the world. The next largest would be one of the European resorts, perhaps Nice. The permanent population of Atlantic City is 47,000; the transient population reaches, at times, 300,000. Even in the middle of winter the figure does not get below 15,000.

The season proper begins about Easter time. All the big hotels are crowded then. There is a falling off during May, but June, the big convention month, brings still larger crowds, filling all the hotels. Boarding houses begin to fill up about the first of July and cottages are also taken. August is the biggest month, the maximum being reached the second or third Saturday. Labor Day marks the end of the rush season.

In spring, people come mostly from the West and North; in summer, from the West and South. The average stay in summer is two weeks or more. There are, of course, many people who come from points nearby, particularly Philadelphia and New York, for only a few hours or days. From 10,000 to 20,000 come from Philadelphia Sunday morning and return Sunday night, while twice as many from that city stay from Friday to Monday.

There are nearly 1,000 hotels whose capacity is over 50, and most of these can take care of over 100. Their aggregate capacity is about 250,000. The Marlborough-Blenheim

is the largest, with 500 rooms, accommodating some 1 100 persons. The Royal Palace and the Traymore each have over 400 rooms, and the Chalfonte, the Dennis and the Rudolf have over 300. The remaining 50,000 of the 300,000 maximum floating population goes into boarding houses and cottages. The cottage industry is a flourishing business. There are hundreds of them. The owners live in them through the winter and rent them in the summer, going themselves to the mountains or even finding it profitable to live in hotels.

From 150 to 250 conventions are held here every year. The hotel people consider the Master Mechanics' and the Master Car Builders' the best. Nearly all the people these two conventions bring stay the full eight days and they spend the most money. All the conventions held this year, with one exception, has been bigger than in 1908. It is fair to compare 1909 with last year because the business depression was not felt here, either as regards conventions or the usual visitors. Some people's incomes were affected enough to prevent them from coming, but these were offset by the added numbers who had more time to spend here and many ordinarily would have gone abroad for the summer.

THE TIME SERVICE OF FREIGHT LOCOMOTIVES.

Considerable study has been made of individual efficiency of the locomotive boiler evaporation, fuel economy and repair costs, but much less attention has been given to the number of hours locomotives are actually engaged in productive service.

The measure of the earning power of locomotives in the transportation of freight is the ton-miles hauled per locomotive per year, and the following is a table of such performance arranged in the order of the ton-miles hauled per locomotive per year for a number of prominent lines. The figures are taken from reports furnished to the Interstate Commerce Commission for the fiscal year ending June 30, 1907, and, being made up in accordance with instructions of the Commission, are uniform and fairly comparable. The names of the roads have been omitted from the statement and the letters of the alphabet substituted:

Fiscal Year 1907. *Freight Locomotive Performances.*

Railway.	Frgt. locomotives.	1,000 net ton-miles.	Tons per train.	1,000 ton-miles per locomotive.	Av'g tractive effort.	Locomotive miles.	Miles per locomotive.
A	334	3,322,000	360	9,947	21,600	10,352,000	30,000
B	399	3,507,000	479	8,789	25,200	11,665,000	29,225
C	403	3,447,000	376	8,553	29,600	10,162,000	25,216
D	629	5,156,000	279	8,197	18,800	25,029,000	39,750
E	629	4,921,000	562	7,824	29,800	11,006,000	17,490
F	922	7,115,000	394	7,717	24,500	18,992,000	20,598
G	141	965,000	308	6,815	23,900	3,612,000	25,617
H	868	5,673,000	324	6,535	30,600	19,753,000	22,756

It will be noted that line H is the lowest on the list, indicating that by no means is it getting an adequate amount of work out of its locomotives.

The main factors which affect the 1,000 ton-miles per locomotive are a low average train load coupled with high mileage per locomotive, or, *vice versa*, low mileage per locomotive accompanied by a large train load. These are necessary to make a good showing in ton-miles per locomotive, which is the main thing in economical operation.

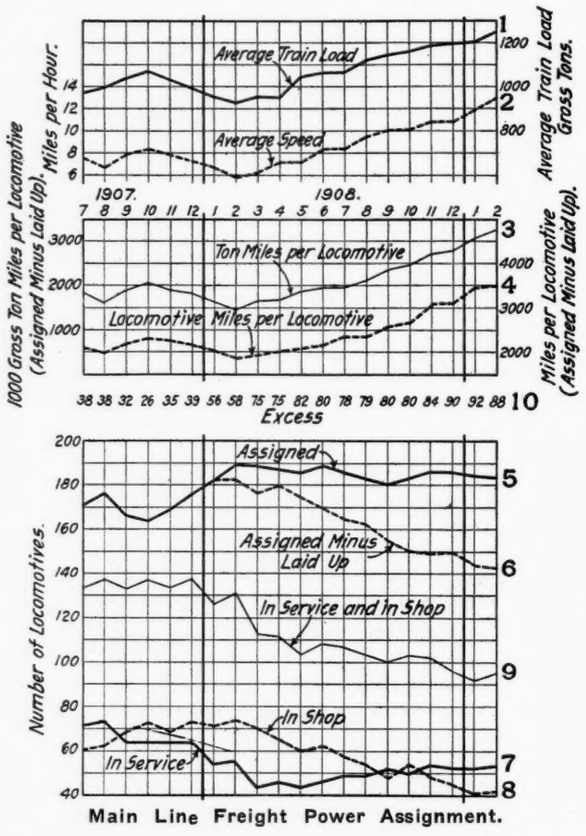
From a study of the table we find that the roads that are fairly close to H in average tons per train (train load) are G, D and A. If H had managed its locomotive assignment as efficiently as G it would have been possible to handle the tonnage with 34 less engines. It will be noted that D and A are run much more economically in ton-miles handled per locomotive than G, and if H had been able to approach their records its business could have been handled with 175 less engines in comparison with D, and with 178 less engines compared with A. G and D have a smaller train load than H.

Comparing H with some of the other roads on a basis of miles per locomotive, we find that B and C, both of which have a greater train load than H, also make a greater mileage per locomotive per year. If H had made its mileage per locomotive equal that of B there would have been a saving of 193 locomotives. If a mileage per locomotive had been obtained equal only to that of C, which is a competitor road and operates through country which is very similar, a saving of 85 locomotives could have been made.

On a ton-mile-per-locomotive basis, and making comparison with the two remaining roads, namely, F and E, we find that H again has a large excess of locomotives. Had H made as good a showing as F in engine performance a saving of 145 engines could have been made, and if it had made as good a showing as E a saving of 143 locomotives could have been made.

It thus appears from a comparison with the other roads that H is furnished with from 100 to 200 locomotives in excess of what the requirements would be if locomotive performance results were equal to those of other roads.

The question arises, by what method, or by what measure, a general manager or superintendent determines whether he has too many or too few locomotives on a given division? The method outlined below should give such officers an accurate measure of how actively the power is employed and should result in a more economical assignment for freight service.



Main Line Freight Power Assignment.

Freight power assignment diagrams prepared for the purpose of showing what effect the number of locomotives assigned to service had upon the performance of each locomotive, especially with regard to ton-miles hauled per locomotive, which is the best standard by which to measure the locomotive performance, demonstrate that an excess of locomotives in freight service has a tendency: (1) To make too few locomotive miles. (2) To make too many trains. (3) To cause too congested a traffic. (4) To increase engine failures. (5) To run up engine maintenance costs. (6) To increase the other costs of transportation—of locomotives and train service and of fuel. It has a tendency to crowd an undue percentage of the power into the shops, to call for too frequent and too extensive or expensive repairs and, because of traffic congestion, to cause a demand for *more locomotives*

to be made whenever there is a prospect of more business being offered than can be handled.

This has been the case in the past, and the problem is to avoid it in future. For every million dollars needlessly invested in surplus motive power means an addition to the yearly operating expenses and fixed charges of from $250,000 to $300,000.

A study of several features of locomotive performance, as indicated by the accompanying diagrams, shows very conclusively that the best performance is always obtained from locomotives when the assignment is regulated by the volume of business to be handled.

It will be noted that when the number of locomotives assigned to service is the lowest, as shown by curve 6, during the month of February, 1909, the performance of each locomotive is the best in ton-miles per locomotive, miles per locomotive, average train load and average speed per hour. And, *vice versa*, when the number of locomotives is the highest, as shown by curve 6, during the month of February, 1908, the performance per locomotive was in all respects the poorest. Investigation further shows that locomotives make the best showing and handle the largest tonnage per month at the time the road's traffic is the greatest. Why is this? It is because, in order to handle the business, locomotives are given maximum tonnage and the speed increased.

It is found by study of the actual records that an increase or decrease in ton mileage per locomotive is directly due: (1) To an increase or decrease in mileage per locomotive during the month. (2) To a decrease or increase in the number of the engines assigned to or in service. (3) To an increase in train speed per hour. (4) To an increase or decrease in the train load.

A close study of the performances shows that the second cause assigned is really the determining one, and in a substantial majority of cases it is found that the divisions actually handled their heaviest tonnage of the year during a month when they had a small—in some cases the smallest—assignment in number of locomotives, or in number of locomotives in service. When business decreases, a number of engines proportional to the decrease in business should be withdrawn from service.

From a mechanical standpoint, the fewer engines, the more efficiency and economically they can be handled, both in shop and roundhouse and on the road. With fewer engines, more attention can be given to each by the mechanical department, with a consequent superior condition and action on the road, and congestion of engines at terminals and shops can be eliminated, as the difficult problem of the mechanical organization is not so much one of repairing engines efficiently as of handling a blockade of power in roundhouse pits and shops. A smaller number of engines in better running condition will handle a larger divisional traffic in larger train loads and fewer trains, with greater mileage per month, at higher average train speed and with fewer delays, either on account of failures or of meeting and passing trains.

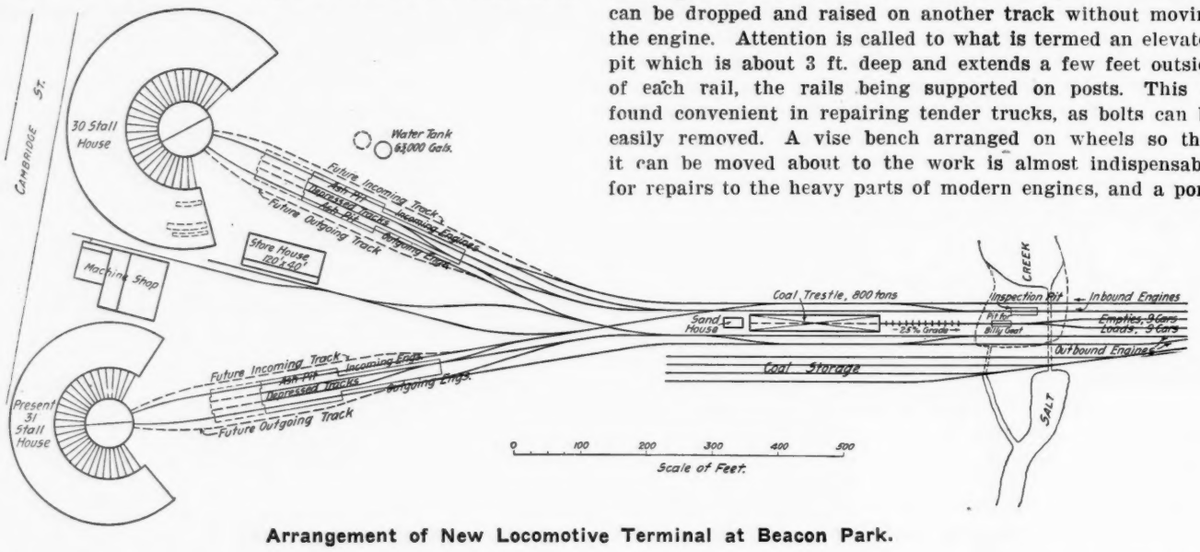
For the purpose of preparing main line freight power assignment diagrams, the data are derived as follows: The average train load is ascertained by dividing gross ton-miles by loaded locomotive-miles. The average speed is computed by dividing locomotive-miles by the time elapsing between the time when all locomotives are registered out of a terminal and the time when they are registered into the next terminal. Ton-miles per locomotive is ascertained by dividing the gross ton-miles by the number of locomotives assigned, minus those laid up in good order. Miles per locomotive is computed by dividing the locomotive-miles by the number of locomotives assigned, minus those laid up in good order. The number of locomotives assigned is ascertained on the basis of the actual time assigned to this class of service and includes those in service, those available for service and those out of service for repairs. The time engines are held awaiting or undergoing shop repairs is treated as assigned to the class of service in which they were used previous to the shopping. The total time that locomotives are assigned to this service in days of 24 hours each is divided by the calendar days in the month, which gives the number of locomotives assigned. The number of locomotives laid up in good order is ascertained on the basis of the time they were actually laid up in good order in days of 24 hours divided by the number of calendar days in the month. The number of locomotives in service is computed on the basis of locomotive hours. The time elapsing between the time when locomotives are registered out of a terminal and the time when they are registered into the next terminal, for all locomotives in days of 24 hours each, divided by the number of calendar days in the month equals the number of locomotives in service. The number of locomotives in shop is ascertained on the basis of the time intervening after they are turned over to the mechanical department for repairs until the time when repairs are completed and the locomotive is ready for service in days of 24 hours each divided by the number of days in the calendar month. The number of locomotives in service and in shop is the sum of the latter two items. The number of excess engines equals the number assigned, minus the number in service and in shop.

The application of this method of following up the assignment of locomotives in freight service on one of the large Western railways has resulted in a reduction of 10 per cent. in the number of locomotives previously in service, with the attending advantages and economies indicated by the first four lines on the diagram.

We print on another page Mr. Vaughan's presidential address, which brings up a topic of great importance—the suggested amalgamation of the Master Car Builders' and Master Mechanics' conventions. Mr. Vaughan reviews the admirable work which has been done in the past years by the Master Mechanics' Association, but he points out a tendency for the association to confine itself exclusively to technical mechanical questions, whereas now larger problems relating to the financial and business conduct of the mechanical departments are crowding in rapidly. Unless this association concerns itself seriously with these new and larger problems, there is danger that this part of the work will come to be done by others. The association, in short, must pay more attention to the commercial side than it has in the past. "Excellent as our work has been, it has, with few exceptions, investigated the technical rather than the business problems of the locomotive." For example, the Master Mechancis have failed to work out the problems of joint regulation as between one road and another, as have been done by the Car Builders' Association, though the reason for this was entirely natural and the constant excange of equipment forced the Car Builders into consideration of this problem long ago. Mr. Vaughan points out that there are now few possibilities of establishing additional standards, and he says it is doubtful if standards could be established in locomotive equipment which would be of much value for the locomotives of the entire country. He adds the important suggestion that it is a reflection on the business ability of railway mechanical departments to continue an arrangement that necessitates a man being away from his work for practically two weeks at meetings of important associations which overlap. We can see no reason why these two great and useful associations should not join hands in the interest of greater mutual efficiency and make a single association concerned with all the vital problems pertaining to the two branches of the mechanical departments so closely correlated, whether these problems be technical or commercial. We believe that the need for this is now well appreciated and there seems considerable likelihood that the preliminaries looking toward some such union may be arranged this year. We wish the movement all success.

LOCOMOTIVE TERMINALS FOR THE BOSTON & ALBANY

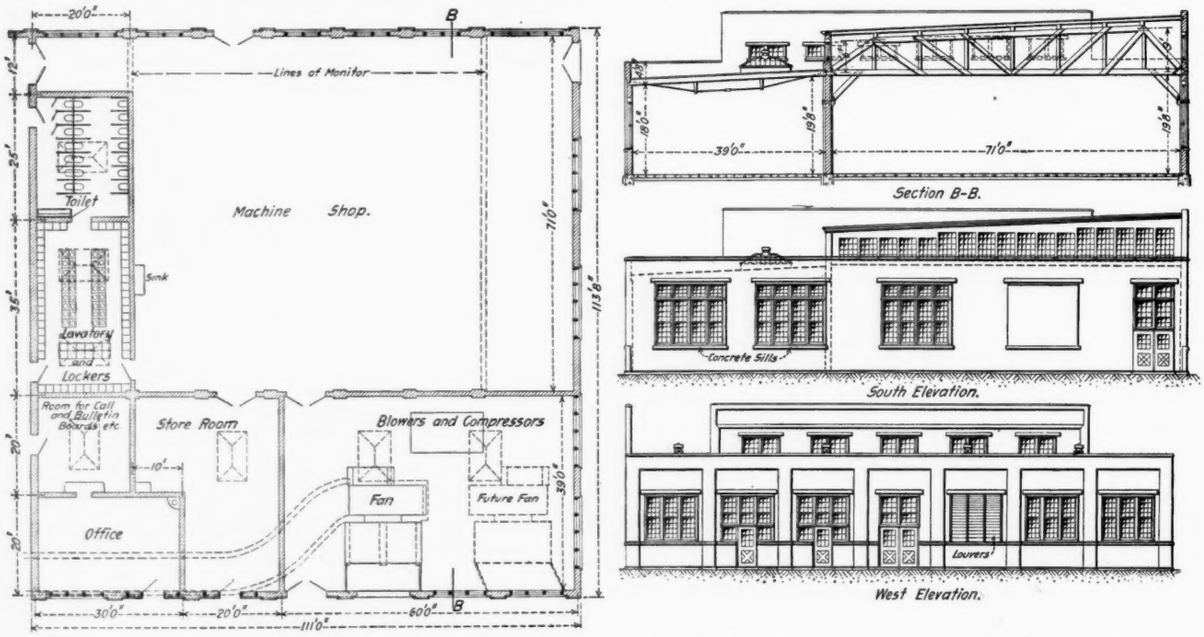
At the October meeting of the New England Railroad Club, R. D. Smith, Assistant Superintendent of Motive Power of the New York Central, read an interesting paper on "Terminal Facilities for Handling Locomotives." The paper was accompanied by drawings showing the arrangement of the new locomotive terminal facilities for the Boston & Albany at Beacon Park, Mass.; at Rensselaer, the proposed roundhouse improvements at West Springfield, and a detail of the machine shop for this point. These drawings are here reproduced. A typical section of the roundhouse at Beacon Park is also illustrated in the diagram, showing the house 93 ft. wide out to out of walls, one-half of it having a peaked roof with a smokejack and ventilator at the apex. The inner half of the section has a lower shed roof and this portion is also fitted with a smokejack.



Arrangement of New Locomotive Terminal at Beacon Park.

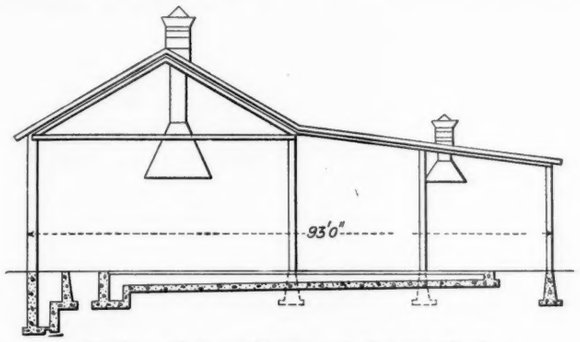
Mr. Smith says that experience has demonstrated that this section for roundhouses is satisfactory and suitable for large modern engines. The outer wall is concrete and the roof truss of wood because it is found that iron trusses in roundhouses corrode rapidly. For a roundhouse floor he recommends 8 in. of cinder upon which is a 5-in. layer of concrete and Portland cement dressing. Vitrified brick placed on edge set on top of another course laid flat in sand also makes a satisfactory floor.

A Pacific engine of late design is about 72 ft. over all, and, allowing 10 ft. at each end for the passage of trucks and an ample aisle, the distance between the inner walls of the roundhouse should be about 92 ft. It is found that rectangular doors swinging outward can be fastened securely and seldom give trouble on account of broken hinges. Good roundhouse practice requires two drop pits located near the machine shop, one for removing driving wheels and one for truck wheels. These pits should extend over several stalls, so that wheels can be dropped and raised on another track without moving the engine. Attention is called to what is termed an elevated pit which is about 3 ft. deep and extends a few feet outside of each rail, the rails being supported on posts. This is found convenient in repairing tender trucks, as bolts can be easily removed. A vise bench arranged on wheels so that it can be moved about to the work is almost indispensable for repairs to the heavy parts of modern engines, and a portable forge also often saves a trip to a fire or blacksmith shop. The hot blast system of heating and ventilating is recommended, as the fan forces hot air into the pits and it is more efficient than the steam pipe system in melting ice and snow. The hot blast also assists materially in ventilating the house. In ordinary weather the air should be changed every 14 or 15 minutes, but in very cold weather it is necessary to change it every 6 or 7 minutes. Good results are obtained with a supply of about 1,800 cu. ft. of air per minute per



Plan and Elevations of Machine Shop at West Springfield.

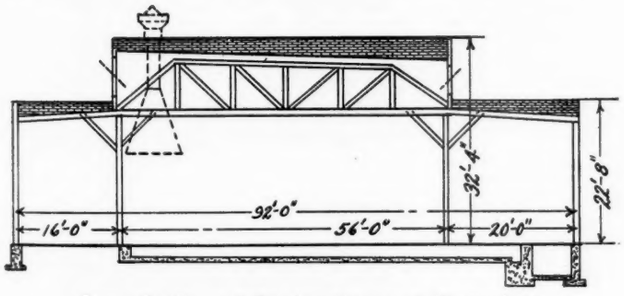
pit. During the past winter the ventilation of the new roundhouse at Rensselaer was found to be very good. The cross section of this house shows the large volume of the upper deck, or monitor, and the detail of the monitor shows a 5-in. permanent opening, close to the roof, which permits the escape of smoke and steam. The swing sash also provides ample ventilation in moderate weather. During very cold weather, when blowing off four or five engines in a 10-section part the house was kept free of steam and smoke by increasing slightly the speed of the ventilating fan. The hot water system of washing out and filling locomotives is recommended as it saves time, which is very im-



Section of Roundhouse at Beacon Park.

portant at such places. It eliminates in a measure the trouble from leaky tubes, and a great advantage is that during the period of blowing off the house is not filled with steam, which is so objectionable. In lighting roundhouses, incandescent lamps will be found satisfactory, but they should be placed about 10 ft. from the floor to prevent them from being removed. The method of wiring for electric lighting by placing the wires in iron conduits has proved to be poor practice, as gases corrode the conduits rapidly. The open wiring system is now used more extensively and has proven satisfactory. The wires are strung on porcelain knobs along the roof and the lamps are suspended from the ceiling or fastened to the walls. It is desirable to have outlets located between the pits for plugging in portable lamps to be used by the men working on the engines.

The extent to which electricity can be applied for various purposes about a locomotive terminal is shown in its use for



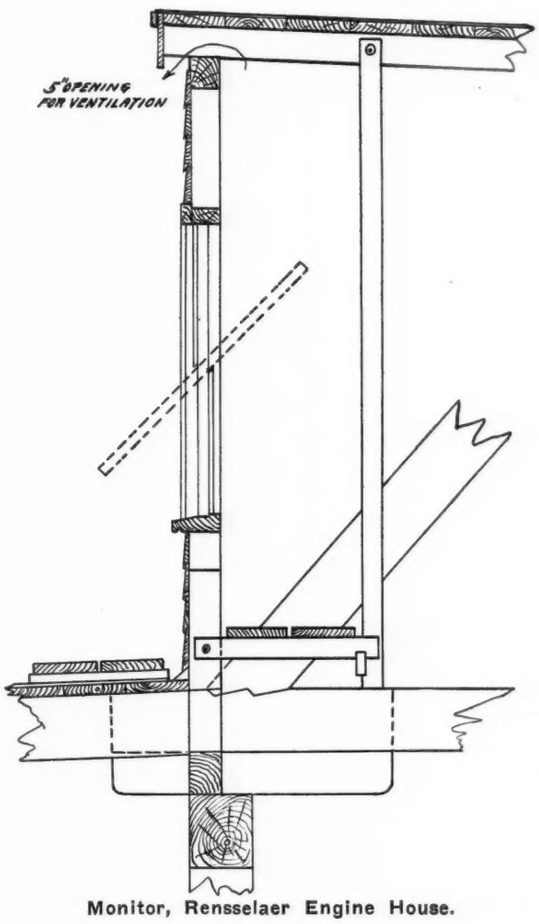
Cross Section of Engine House at Rensselaer.

motors at the turntable, coal chute, sand house and cinder pits. All these should be well lighted, so that quite a large quantity of electricity is used; and it will often be found cheaper to install a generator set than to buy the current.

In order to turn large Pacific locomotives, turntables should be at least 85 ft. in diameter, as the wheel base of these engines is 68 ft. At important terminals it is sometimes advisable to have turntables fitted with two tractors, one using gasolene and one at the other end driven by an electric motor, to insure the operation of the table in case one motor is out of order. The cost of operating these two different kinds of motors for turntables is stated to be practically the same.

In track arrangement it is important to handle engines quickly and economically, and the tracks ought to be arranged so as to avoid interference. Two incoming and two outgoing tracks are recommended, and it is well to provide cross-overs to permit quick movement of several engines on the same track.

The coal stations used at these new roundhouses will be supplied by the Link Belt Company. They have many unique features and are believed to be the most thoroughly up-to-date and satisfactory mechanical stations yet put into service. At one point, where 100 engines will take coal in 24 hours, the capacity of the coal pocket has been fixed at 800 tons. This is sufficient to furnish coal during periods of repairs to machinery and delays caused by interruption of supplies. The coal pockets should be located so that engines can take coal inbound or outbound, the principal reason being that on modern engines the tubes must be cleaned from the firebox end and this cannot well be done when the tender is full of coal. In a locomotive with modern front end appliances it is impossible to clean out stopped up tubes from the front without removing the draft appliances. It is objectionable



Monitor, Rensselaer Engine House.

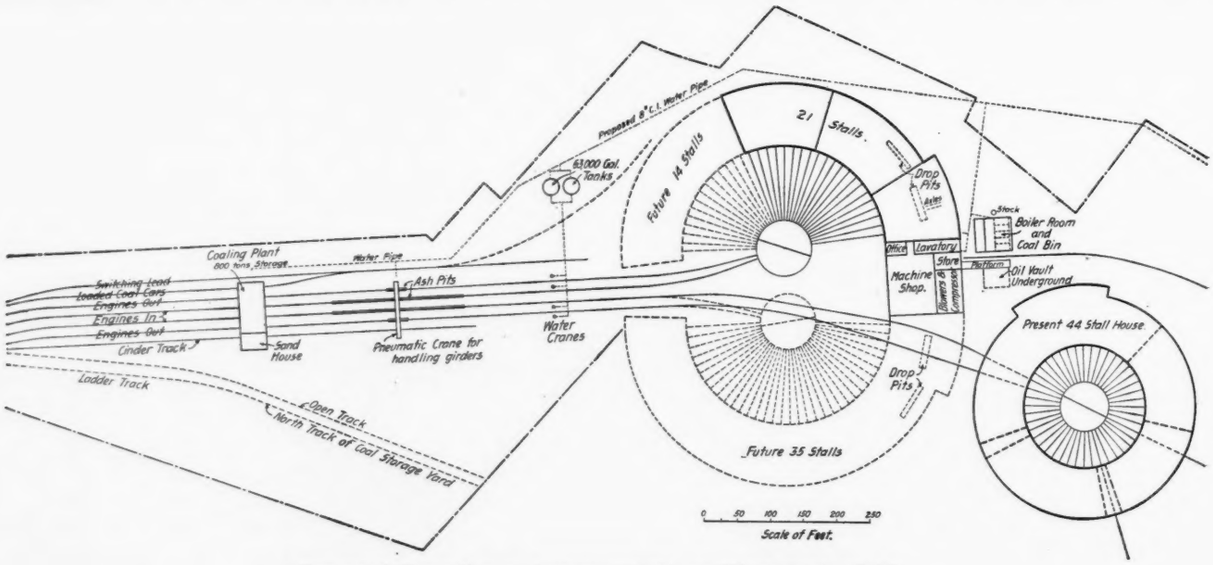
to do this, as they are carefully arranged so as to produce the most efficient draft, and it is not only expensive but many chances are taken in getting them back in their original shape so as to insure good steaming.

The method of kindling fires in locomotives should have attention, especially where wide fireboxes are used. The use of wood is out of the question because of its high price. Fuel oil is now found more economical. The Ferguson fire kindler for lighting fires in locomotives has been found successful. This machine consists of a tank, holding about 20 gal. of fuel oil, mounted on wheels. An air hose is attached to a special valve and the air passes through an atomizer valve to the heater and the vapor produced by the mixture of oil

and air is carried with a hose to the portable burner which can be placed in any position. It is especially applicable to lighting a fire either below or on top of the grates, whichever is most convenient. This machine, in addition to its usefulness in kindling fires, can be used in heating tires and bent frames, and is quite a necessary adjunct to a well-equipped engine house.

The author, who has had a large experience in connection with locomotive operation and work about roundhouses, does not seem to be favorably impressed with mechanical methods for handling ashes. He says that probably the best means of handling ashes is to shovel them just as directly as may be from the place they are dumped to the ordinary car in which they are to be shipped. If these cars are arranged on a depressed track close to a clinker pit at such an elevation that the ashes are shoveled direct from the pit to the car without any further handling, this would seem to be the most satisfactory manner. Many plans are in use for handling ashes with machinery, and while the designs look attractive they are expensive in first cost, in operation and in depreciation of the machinery. He concludes that the less machinery used in connection with the handling of ashes the better.

In concluding his paper, Mr. Smith said: "Terminal facilities should be arranged in such a way that the engines can be given proper attention with the least possible delay and at reasonable cost."

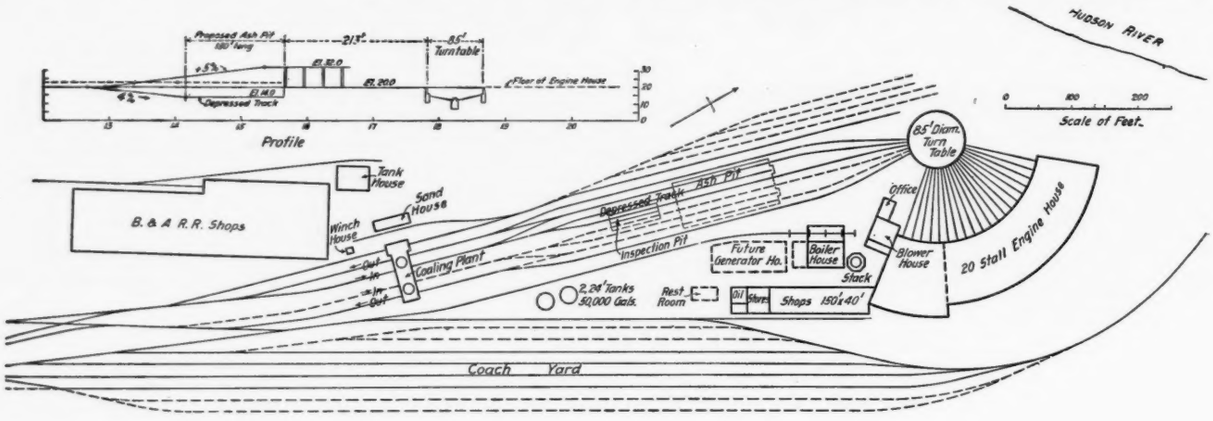


Proposed Roundhouse Improvements at West Springfield.

RAILWAY BUILDING IN THE SIXTIES.

The organization for the construction of the Union Pacific railway was purely upon a military basis. Nearly every man working upon it had been in the Civil War; the heads of most of the engineering parties and all of the construction forces were officers in the Civil War; the chief of the track laying force, General Casement, had been a division commander in the Civil War, and at any moment I could call into the field a thousand men well officered, ready to meet any crisis or any emergency. There was no law in the country, and no court. We laid out the towns, officered them, kept peace and everything went on smoothly and in harmony. Two or three times at the end of our tracks a rough crowd would gather and dispute our authority, but they were soon disposed of.

I remember one incident when I was West, near Salt Lake, of receiving a despatch that a crowd of gamblers had taken our terminal point at Julesburg and refused to obey the local officers we had appointed over it. I wired General Casement to take back his track force, clean the place up and sustain the officers. When I returned to Julesburg I asked Casement what he had done. He replied: "I will show you." He took me up to a little rise just beyond Julesburg and showed me a small graveyard, saying, "General, they all died in their boots but brought peace."—*Memoirs of Gen. Grenville M. Dodge.*



Arrangement of New Locomotive Terminal at Rensselaer.

MASTER MECHANICS' ASSOCIATION.

Proceedings of the First Session of the Forty-second Annual Convention.

The first session of the American Railway Master Mechanics' Association was held in the Greek Temple on Young's Million Dollar Pier, Atlantic City, N. J., on Wednesday, June 16.

The president, H. H. Vaughan, Canadian Pacific, called the meeting to order and invited the past presidents of the Master Car Builders' Association and the Master Mechanics' Association, and the officers and members of the executive committees of those two associations to come up on the platform. The Rev. Dr. Newton D. Cadwell, pastor of the Olivet Presbyterian Church, opened the meeting with prayer.

President Vaughan then read the following address:

ADDRESS OF PRESIDENT VAUGHAN.

In 1868 six master mechanics attending the Master Car Builders' convention at Dayton decided to call a general meeting at Cleveland to organize an association of the master mechanics of the United States and Canada. At that meeting, which was held later on in the same year, fifty were present, representing many of the most important lines of railways in the country and a constitution was adopted with the following preamble:

"We, the undersigned railway master mechanics, believe that the interests of the companies by whom we are employed may be advanced by the organization of an association which shall enable us to exchange information upon the many important questions connected with our business."

These words outlined the object with which the new society began its career, adopting as its purpose the discussion of the best methods of construction and operation of the locomotive at a time when it had just emerged from the experimental stage and was assuming a permanent and fairly uniform design. It had already taken its place in the world as the most powerful and economical engine of transportation, but few even who were connected with it in those days could have foreseen the development it was to undergo, or the extent to which it would render possible the cheapening and extension of the transportation facilities of the world, the chief factor in the wonderful change that has taken place in the relations of nations, the distribution of food supplies and the growth of manufactures, cities and continents.

The association so quietly started was well founded. It had chosen for its aim a work that was needed, and as the railways of the country grew, it grew with them, until now, forty-one years later, we have a membership of nine hundred and sixty-one (961), representing every railway in the United States and Canada, and a large number of those in foreign countries. It has been unique in its devotion to the locomotive and its problems alone, but its object has proved worthy of its attention, and we are to-day confronted with problems just as important as those which our predecessors considered, none the less vital to us because they are broader in scope and because financial considerations are now more closely connected with those which are purely technical.

I have always been deeply interested in the history of this association; I have been a great admirer of the work that it has done, and I am going to take this opportunity to speak to you of the success it has obtained, the methods it has used, and the opportunities that lie before it for the future.

H. H. VAUGHAN,
President, Master Mechanics' Association.

It is impossible to review in detail the work which has been accomplished; the mass of information contained in our proceedings is too great for individual reference. To even touch on the more important subjects would necessarily result in a mere catalogue. Figures are but a poor way of illustrating results, but in the forty-one years of our proceedings three hundred and fifty-one (351) reports of committees, sixty (60) individual papers and one hundred and fifteen (115) topical subjects have been presented and discussed. Of these reports and discussions it may be stated that one hundred and twenty-six (126) contain information of special interest at the

present time, while two hundred and eighty-three (283) are of specific value, either in whole or in part. While this classification is to a certain extent a matter of opinion, it shows most decidedly the general excellence of the work which this association has done. It has investigated almost every conceivable subject connected with the locomotive, its construction, operation and maintenance, developing, criticising and discussing it as it progressed from the little sixteen-inch (16") eight-wheeler of the sixties to the magnificent freight and passenger equipment of the present day. To say that the wonderful development that has taken place is entirely owing to the work of our association would be an exaggeration. Apart, however, from the facts determined in our reports, the improvements they have suggested, and the practice they have introduced, our meetings have year by year been attended by the men engaged in carrying on and advancing this work. They have presented their own views in our discussions, they have heard the views of others, and, whether speakers or listeners, have returned home from our conventions with their opinions modified, new ideas conceived and their experience broadened. With that renewed energy and interest in their work which invariably results from communication with other workers in the same field, they have put into practice suggestions which have been advanced and by their daily work have together built up that mass of knowledge and experience that has resulted in the production of the American locomotive of to-day. In such ways, as well as by the exchange of information, our association has succeeded in its object in being of benefit to the railways by whom our members are employed.

Our work has not been limited, however, to the exchange of information, but from the very beginning our committees have done far more than obtain and report existing facts or give the opinion they have formed as a result of their inquiries. This has been an important and valuable portion of their work, and our history shows that in the large majority of cases it has been done well. The answers received to the letters of inquiry have frequently indicated a great divergence of opinion or a lack of proper knowledge, while our later experience has justified the committee's decision. Their reports have presented carefully thought out and correct conclusions, which have, through their evidence of thorough investigation and the standing of the members of the committees, been widely accepted and of valuable assistance in establishing advanced practice. A development of their work to which I wish to call your attention has not, I believe, been generally awarded the credit it deserved, yet it has been the source of the greatest influence exerted by our association, and of the importance of its service to the railways. I refer to the investigation of the scientific principles underlying the questions assigned to our committees, the tests and experiments they have carried out when necessary to determine additional data, and the correct and practical conclusions they have deduced. As a result their work stands to-day as the basis of most of our scientific knowledge of the locomotive, the engineering principles on which it is designed, and the reasons for the methods by which it is operated.

I do not mean that we have to look to our committee for all the knowledge that is available on the theoretical mechanics of the locomotive, or for such researches as those on the properties of steam, the strength of materials, or the chemistry of combustion. That has been the work of the mathematician or physicist, and its value in solving the practical problems of engineering is limited by the vast number of factors which enter into actual working conditions. Our work on the other hand, has been the observation and interpretation of results in a scientific manner, and through being carried on by practical men, who have established the relation between the facts they ascertained, and the theoretical principles underlying them, has been sound in its basis, and rendered general in its application.

Probably the best example is the series of experiments on exhaust nozzles, stacks and steam passages. This began with the road tests which were carefully carried out in 1879, the experiments carried out in 1890, which were independent of road conditions, the first record of that kind in our proceedings, and in 1891 tests of a high degree of scientific excellence which indicated the benefits obtained by lowering the nozzle. It was then intended to continue the experiments at Purdue, but when that laboratory was destroyed by fire a locomotive testing plant was constructed by the chairman of the committee which was, with the exception of that at Purdue, the first in existence. The experiments made upon it were the first careful and thorough investigations of the action of the blast and the result of variations in design of nozzles and stacks that had been carried out on an actual locomotive on a testing plant on which uniform working conditions could be maintained. The results were given in the report of 1894 and the great report of 1896, which will be remembered as the best report up to that time presented to this or any other society on a subject connected with locomotive engineering. Supplemented by the more recent work, this subject stands as one of the most scientifically and carefully investigated details of the locomotive, and its history is one of which our association should be proud.

The test of compound locomotives presented in 1892 marked an important advance through recording the first complete and properly conducted road test, using the dynamometer car, indicators, accurate measurement of coal and feed water, the quality of the steam, and the measurement of various losses. These methods although previously applied along similar lines on stationary plants yet marked a decided advance in locomotive work, and supplemented by the report on the standard method of conducting locomotive tests have assisted materially in defining conditions that should be observed if accurate results are desired.

The subject of locomotive capacity has always been well handled and our recommendations in this respect have exerted a considerable influence and have been widely used. One report is of special interest, that of 1897, in which was presented the first comprehensive study of the characteristics of the locomotive, since made familiar to us by the work at Purdue University and the St. Louis Testing Plant. Then, however, the subject was broadly new and such a method of treatment almost unknown, but it marked the important discovery of the locomotive as a machine with definable properties, although of wide variations, as opposed to the indefinite views on its capacity and economy which were previously held.

Other notable reports of a general character were those on high steam pressures in 1898, the loss of power from friction in the machinery of a locomotive in 1906, and the results obtained from briquetted coal in 1908. There have been many others of more detailed nature, but which indicate the valuable character of our experimental work. Among the more important are those on driving wheel tire wear, in which the forces acting were carefully analyzed and compared with the wear actually found, showing distinctly the cause of the trouble; the report on engine truck swing hangers in which indicating apparatus was used to determine the action of an engine with different types of suspension; the report on slide valves, in which the dynamometer was used in the valve stem, and the forces shown compared with those determined by elaborate calculations of the various stresses; the reports on counterbalancing which have established the allowable disturbing weight, and the specifications for materials in which laboratory tests have been compared with an enormous number of service results. Add to these reports others, which by their high degree of merit have had a far-reaching effect on our railway work, such as those on ton-mile statistics, repair shops, and the education of apprentices, and the whole forms a series of progressive and leading contributions to the science of locomotive design and operation which has produced a permanent effect and has demonstrated correct principles to the entire locomotive world. For years past locomotive practice in America has been based on scientific knowledge, and such questions as the proportions of heating surface and cylinder capacity, and the designs of front ends have been decided by the analyzed experience of the entire country, or carefully conducted experiments. In foreign countries where no such association as ours has existed, these matters have been left to the judgment of the individual or what are practically rule of thumb methods. Few realize what this work has done for the railroads of the country, but the result is seen in the general success of our locomotive practice.

That our association has done its self-assigned work energetically and efficiently, there is no question. Its history is practically that of the modern locomotive in America, and from the years when lengthy discussions on iron versus steel for firebox plates, the cause of boiler explosions, and the proper thickness for the shell of a boiler were the live issues at our meetings, through the periods of air-brakes, injectors, high-pressure boilers, compound locomotives, and testing plants, to our present times with Mallet engines and superheated steam, the association has been untiring in its interest in each new subject that has been introduced and its members individually have shown their interest by their attendance and the large amount of time they have devoted to the work. In no other country has there been any similar society organized to consider the problems of locomotive construction and maintenance exclusively, and we may justly feel that the predominating excellence of American practice is in no small degree due to our efforts. Our work has been well done. We have formed an immense machine for the interchange of information and have added to that, our expressed intention, by having also carried out a large amount of experimental investigation.

What further can we do to increase our usefulness and develop into still more important fields of work? I feel that

in making suggestions I am recording my own sins of omission, and yet when a man endeavors to seriously consider such a question, ideas occur to him that previously lay dormant or unthought of, and this must be my excuse for recommending now what I have not done. Our opportunities are somewhat different from those of our great sister society, the Master Car Builders' Association. We have no such business relationships to regulate between one road and another as those involved in the interchange of equipment. The possibilities of establishing additional standards that would be extensively used are few, and indeed it is very doubtful whether standards are of much value for the locomotives of an entire country. We must consequently ask ourselves whether we are obtaining all classes of information that are of possible value, and whether our committee reports, individual papers and topical discussions could be advantageously supplemented by any other activities.

We are face to face with several changes in the development of our motive power and the department having charge of it. The steam locomotive, that has been supreme for so many years, is finding its superiority questioned by a new invention, the electric locomotive. The small railways with its individual methods is being absorbed into large systems, and superintending and recording the work under the charge of our members is becoming more difficult. The growth of the large mechanical departments has made it impossible and in fact undesirable for their heads to retain the same touch with minor mechanical and operating details that they formerly had to, and has increased the importance of the financial and business questions they should control as compared to those of a mere technical nature. Unless this association and its members concern themselves seriously with these new and larger problems, there is danger of their work being undertaken by others in place of by ourselves.

The articulated locomotive has increased the field of the steam locomotive and enabled it to compete on more favorable terms with its younger and more powerful rival. We should be informed of every development in this line, the results and the experiences that are being obtained and the reduction in the cost of transportation that is being realized. We should also, I feel, know more of electric operation, so that as motive power officers we may be better informed as to its advantages and disadvantages, and may be in position to assist in deciding on the proper system to employ.

The advice of men experienced in motive power matters is needed by the railways in making decisions on this question. To be of value it must be based on a thorough understanding of the subject and a familiarity with its difficulties. I would urge your giving earnest attention to this important subject, which thus far has received too little consideration by the men who best understand railway motive power conditions.

Systems of organization are changing with the changes in our railways and new methods are being introduced for watching results. We should compare experience as to the efficiency of various types of organizations, obtain more information as to the best forms of records, statements that are actually found useful and successful in practical service; comparisons that can be made on a reasonable basis and are interchangeable.

I believe we should endeavor to pay more attention to the commercial side of our work than we have done in the past. Excellent as our work has been, it has with few exceptions investigated the technical rather than the business problems of the locomotive.

We certainly do not want to decrease our attention to technical matters, but could we not with advantage to our members and to the railways take more interest in, and exchange information with each other more fully on, factors connected with the cost of operation?

It is true that some years ago a standard postcard performance sheet was adopted and for a time was extensively exchanged, but it fell into disuse, and yet a properly prepared performance sheet, giving figures useful and possible of comparison, would, I feel sure, be of considerable value and interest to us all. The benefits of a membership in this association would be increased by information as to each other's cost of engine house expenses and supplies, of repairs and fuel consumption, the percentage of power in shops and out of service, and a number of other figures that have to be continually watched. Knowledge of the results obtained by others would assist us all in gaging our own performance, in more easily locating the branches in which we are deficient, and in encouraging all to a higher uniformity of accomplishment.

In short, without in any way reducing the interest we have in locomotive engineering, we must take up in a far more businesslike and serious way the financial problems connected with the operation of the locomotive department, the form of organization that will give the best results, the commercial aspect of the work of a motive power official in conducting his department as though he were manager of a large business enterprise.

Take as an instance of comparing costs the operation of our repair shops. We manage the largest collection of factories in the world devoted to one substantially uniform product, the repairing of locomotives, and our total expenditure for this item alone amounts to about eighty million dollars per year. Each and all have the keenest interest in knowing whether our methods are the best and our costs among the lowest. A few years ago comparisons would have elicited little, but some statements of performances which were exceptionally worthy of imitation; to-day, with the progress that has been made in shop engineering, there is no reason why properly trained observers should not record time studies containing the necessary data to prepare intelligent and valuable statements about one operation after another that is performed on substantially the same parts in hundreds of shops from the Atlantic to the Pacific. Such work is possible and it has already been performed in several shops by experienced engineers. If carried on by a properly organized bureau under our auspices, it should be of the greatest value not only to the railways of this country as a whole, but to our members individually. By comparing operation by operation their results with those of other roads, and by analyzing their methods and available machinery, they would be enabled to improve the one or justify their expenditure for additions to the other. This is but one of many questions connected with the operation of our mechanical department which will occur to you, on which some systematic interchange of information would be of material assistance.

What I wish most strongly to impress on you is that while still carrying on the technical work that has been so splendidly successful, we should pay more attention to the business problems under our control in which we can be of such mutual service.

Our methods of obtaining information might also, I consider, be supplemented to advantage by effecting closer relations with the various railway clubs. The circular letter has been a practical failure in obtaining general information, and I feel sure that the railway clubs would welcome reference to them of certain subjects for their opinion, especially those on which the experience of the men actually in touch with the work is required. They have a large membership, representing every section of the country and every class of men engaged in locomotive work. On many subjects their views would be of far greater value than those obtained in answer to circular letters, especially on questions similar to those suggested for topical discussion.

A valuable practice which obtained in the past, but which has been discontinued in recent years, was the appointment of a committee to report on the advancement in locomotive practice during the year. There are numerous small improvements devised in railway shops which would be collected by a committee gaining its information from the railway clubs. These improvements, while not of sufficient importance in themselves to justify a report or paper, are of considerable value in our successful operation, and presented by a committee would have sufficient indorsement to insure their being carefully considered.

Co-operation with the railway clubs would also relieve the association of the discussion of details of minor importance which have occupied so much time in the past. Such discussion is necessary, and, in fact, of the greatest value, but it more properly belongs to local societies where local conditions are understood and where it can be carried on just as efficiently and satisfactorily as when occupying the time of a national association.

Our association could, I believe, also be of considerable value with reference to the various legal questions that are arising in connection with locomotive construction and operation, by co-operation with the American Railway Association. We could provide a systematized organization for obtaining the opinions of the railways with the proper representation for each section of the country and a meeting at which important questions could be discussed.

Any development in this direction must, however, come at their request, and we can simply indicate our willingness to undertake any work in which we can be of use.

The present system of holding the conventions of the Master Mechanics' and Master Car Builders' associations in two separate weeks prevents many from attending one or the other. The consequence is, the attendance is largely divided, and unfortunately so, as the majority of the members of either association are equally interested in the other. There are two remedies: the first, to hold the two conventions in one week; the second, to unite the two associations. When this was last proposed by the late Mr. Pulaski Leed in 1898, our executive committee was instructed to confer with that of the Master Car Builders' Association, but, although a report

was made to the succeeding convention, suggesting that both conventions should be held during the same week, nothing was done.

It is a reflection on the business ability of our mechanical departments to continue an arrangement that necessitates a man being away from his work for practically two weeks at the meetings of important associations, which he should, for his own sake, and that of the railway employing him, attend and take part in.

There is to-day no valid reason for maintaining two separate mechanical railway associations. All the officers and members of the executive committee of the Master Car Builders' Association, with the exception of two, seventy-five (75) per cent. of the members of the standing committees, and seventy (70) per cent. of the members of the special committees, hold joint department titles.

These figures demonstrate most clearly the amalgamation that has taken place between the car and locomotive departments on our railways. They justify the statement that the time has arrived not for the absorption of one of our associations by the other, but for their uniting into one society, call it, if you please, the American Railway Mechanical Association, which would consider both car and locomotive matters. Such a step is demanded by the spirit of the times, to conserve the forces of our railway officers and economize their time. It is one of the most important questions we have to deal with, and I would impress on you the necessity for action being taken to remedy the present conditions.

The help of our association has been requested by the National Conservation Commission, and it has been informed that our resources would be at their command either for purposes of investigation or to ascertain the recommendations of our members in any respects in which we could be of service to them. A committee was also appointed which could co-operate with them if required, or with any of their committees, but so far this has proven unnecessary, and our position has simply been that of exhibiting our willingness to perform any work that might assist this important movement. We have, however, our own share to carry of the duty of the nation to posterity. The railways are one of the largest consumers of coal, and in most cases peculiarly indifferent to the economy with which it is used. About two hundred millions of tons are annually burned in locomotives alone, and we do not therefore need to ask in what direction we can be of service in assisting this commission. Our work is before us. We should individually, and as an association, use every means in our power to impress on our railways the importance of this expenditure, one of the largest we are responsible for. The reduction in the present rate of consumption that it is our duty to make will not only lead to an immense saving in expense, but will assist materially in the conservation of the natural resources of the country.

At our last convention several of our members were asked by members of the American Railway Association to introduce an alteration in our constitution whereby subjects involving legal, transportation, permanent way or traffic questions or for any other reason requiring such action may be submitted as recommendations to the American Railway Association. In response to this suggestion, a committee was appointed who have recommended the change which they consider advisable, which will be submitted to you at this convention. Your executive committee has carefully considered the amendment and indorse it as a progressive step in the orderly grouping of the important associations which are all working toward the development and advancement of American railway work, associations of which our own is one of the largest and oldest. An innovation, however, this amendment certainly is, and it has led me to speak to you of the work this association has done for the railways, its history, its achievements and its problems.

Ladies and gentlemen, with sincere pleasure and a deep personal appreciation of the privilege, I welcome you to this, the fourth convention at Atlantic City, and the forty-second in the history of the association; I hope also, to a meeting that may prove to be of the same value to the motive power departments of our railways, of the same interest to our members, and of the same high standard from an engineering and executive standpoint, as has one convention after another in the past. In at least one respect this convention is specially fortunate, the exhibition of railway tools and appliances that has been arranged by the Railway Supply Manufacturers' Association. While, during the past year, the depression in business affairs which began in 1907 has continued with but slight improvement until the last few months, it has only spurred our manufacturers to fresh endeavors, and we are met this year with the finest collection of exhibits we have ever been fortunate enough to view, installed in an orderly and systematic fashion. Such an exhibition is in itself a valid reason for our attendance, were it simply to see the latest and best in railway material, and I have no hesitation in voicing the thanks of the association to the men who have organized and carried out this work with such ability and enterprise.

Secretary Taylor then presented his report.

The report showed total active membership June, 1908, 828; new members during the year, 74; total June, 1909, 902. Associate members, June, 1909, 19; honorary members, June, 1909, 40. Total membership, 961.

The secretary's report showed the following financial transactions during the year: Receipts, $6,319.79; expenses, $6,248.29; balance, $71.50.

The secretary's report stated that H. A. Houston was filling the Joseph T. Ryerson scholarship at Purdue University in an excellent manner; also that R. S. Booth, son of the Master Mechanic of the Carolina & Northwestern, was entitled to one of the scholarships which will be vacant at Stevens Institute in June, 1909.

The secretary's report referred to the deaths of the following active members: R. H. Soule, President 1896-7; G. W. West, President 1902-3; G. W. Butcher, J. W. Roberts, A. B. McHaffie, M. J. Lynn and H. M. Minto.

The secretary further stated that under the will of Emma A. Tillotson, deceased, widow of Luther G. Tillotson, of New York, the American Railway Master Mechanics' Association had received a legacy of $5,000. The Executive Committee had decided to receive and invest this, the interest to be applied to such investigations as the Executive Committee may recommend to the association to defray the cost of such investigations; the form of investment to be left to the treasurer, subject to the approval of the Executive Committee.

The secretary then presented the report of the treasurer, which showed a balance on hand June 16, 1909, of $1,283.73.

The action of the Executive Committee in fixing the dues of the association for the coming year at $5 per year was approved.

C. H. Hogan, representing the Traveling Engineers' Association, was extended the privilege of the floor during the convention.

The following committees were appointed: On Auditing: L. R. Pomeroy, O. M. Foster and D. F. Crawford.

To report on the recommendation in the president's address: L. G. Parish, F. H. Clark and B. P. Flory.

On Obituaries: G. R. Henderson on R. H. Soule, P. H. Minshull for George W. West, J. J. Ryan for George W. Butcher, B. D. Lockwood on J. W. Roberts, W. H. Wilson on M. J. Lynn, J. G. Clifford on H. M. Minto, G. R. Joughins on A. B. McHaffie.

Correspondence and Resolutions: G. M. Basford, L. G. Parish and C. A. Seley.

Henry Schlacks was elected an honorary member, and E. C. Schmidt (Univ. of Ill.), an associate member of the Association.

The President—Is there any more new business to be brought before the Association?

C. A. Seley (C. R. I. & P.).—There will appear before the Master Car Builders' Association a committee from the Railway Storekeepers' Association to urge the passage of a resolution calling for a committee in that Association to co-operate with a similar committee in the Storekeepers in the matter of arranging systematic specifications for lumber. It has been thought desirable that this Association be also represented by a committee to take part in this consideration, and I therefore move the following resolution:

"Whereas the wide variations which exist in the specifications for different classes of lumber which have been adopted as standard by the individual railways, departing as they do in many cases from the established commercial customs of the lumber manufacturers, and as there is a lack of standard lumber grades to meet all of the railways' requirements, tending to increase the difficulties of the railways in securing an adequate and uniform supply of lumber of a suitable quality, promoting differences between the manufacturers and the railways in regard to the proper inspection, and to increase the price which the railways are obliged to pay for their supply of lumber:

"Therefore be is resolved, that a committee be appointed to act jointly with similar committees from other railway associations to formulate recommendations as to lumber grading suitable for railway use, as an official description of the different qualities or grades of lumber to be used for all railway work, and that in determining upon the proper quality of lumber to be used for any purpose, each member of this Association may be guided by said standard grading rules and may select from among the different grades therein described such quality as shall be considered best adapted for the particular purpose in view and may arrange with the purchasing and supply departments to place their orders and inspect the lumber in conformity therewith."

I move the adoption of that resolution, the committee to be

appointed after the committee has been appointed in the Master Car Builders' Association, in order to have a good combination.

Motion carried.

D. F. Crawford (Penna.).—As most of us know there is a bill before the Federal Congress in regard to the inspection of locomotive boilers. I think it is a subject we are all interested in, especially as to getting uniform information regarding the subject of the inspection of locomotive boilers; and I would like to move that a committee of this association be appointed to report here Friday morning as to whether there is any action this association could take to assist the railroads in getting data on the subject, or any other information regarding the bill.

The President—I will appoint Messrs. Crawford, Manchester, McIntosh and Curtis as members of the committee.

The first report to be presented was on Mechanical Stokers. Mr. Rumney, chairman of the committee, was not present, and Mr. Crawford presented the report.

Discussion on Mechanical Stokers.

E. D. Nelson (Pennsylvania)—The committee gives in the table the fuel hours per ton mile, which, I presume, means the fuel per hour per ton mile. We are familiar with the fuel per ton mile, but it is not quite clear to me how the hourly factor is of value in that connection. The same thing applies to the combustible hours per ton mile.

G. R. Henderson—On page 4 of the report reference is made to the increase in tractive power of large locomotives and in the increased fuel consumed per mile to maintain this tractive force, and that a successful automatic stoker should render locomotive firing more attractive and raise the standard of the service.

When this subject was discussed last year, we called attention to the fact that a great many of the large modern locomotives were not giving returns in hauling capacity commensurate with the size and cost of the locomotive, apparently on account of the impossibility of one fireman getting sufficient coal into the firebox, and we advanced the argument that an automatic stoker would be necessary in order to realize the full benefit of such large locomotives. Since the last meeting we have had occasion to estimate the probable advantages on a large Mallet locomotive of an automatic stoker, and we thought that the figures might be interesting to the members of this association.

The division to be covered by this locomotive was 100 miles in length, against the traffic, of which there is a 0.5 per cent. compensated up-grade 40 miles long, and the remaining 60 miles are practically all down-grade. The locomotive upon which our figures were based was of the Mallet type, having a tractive force of 65,000 lbs., which would enable it to haul at slow speeds 4,200 tons up the 0.5 per cent. grade, on which our figures were made, ascending the grade at 6, 10 and 15 miles per hour. It was assumed that one fireman could handle 3,000 to 4,000 lbs. per hour throughout the 40 miles up-grade, or that two men, by working in relays, would be needed to supply 6,000 to 8,000 lbs. an hour, but for quantities over this a mechanical stoker would be necessary. As the grate area of this locomotive is 78 sq. ft., it will be seen at once that it would be possible to burn from 12,000 to 15,000 lbs. of coal per hour if found desirable or necessary. In making these figures, the following units were assumed: The actual time between terminals would be 20 per cent. greater than the running time, this allowing for lay-overs, etc.; the down-hill speed would be 30 miles an hour; the cost of the coal was taken at $1 per ton and of water at 5 cents per thousand gallons. Allowances were also made for repairs, renewals, pay of enginemen, handling at terminals and interest on investment. It was considered that there would be 5 hours consumed in turning the engine at the terminals of the division, and the cost of train supplies, car repairs, pay of trainmen, etc., were included, so that the figures show the actual cost of operating the train, but, of course, do not cover the general expenses of superintendence, maintenance of track, buildings, bridges and other data except the usual train operation, which figures really comprise only about 40 per cent. of the total cost due to all expenditures of the road. The cost was figured out for the total movement on one trip, also for 1,000 ton miles of train back of engine, including the weight of the cars and ton miles per hour performed by the engine, with the allowance of five hours for turning, as above mentioned. These figures, therefore, enable one to see at a glance the variation in cost and capacity due to one or two firemen, or to a mechanical stoker. The figures are given below:

Speed, up hill, m. p. h.	6	10	10	15	15	15
Cost, mvemnt, pr trip	$79.93	$82.35	$62.18	$87.05	$67.00	$50.38
Cost, per 1,000 tn-mls	.19	.20	.21	.22	.22	.25
Ton-miles, per hour	27,300	34,400	24,600	38,000	28,300	19,000
Wt. of train, tons.*	4,200	4,200	3,000	4,000	3,000	2,000
Method of firing	1 fireman.	2 firemen.	1 fireman.	Stoker	2 firemen.	1 fireman.

*Train back of tender.

It is seen therefore that by far the greatest amount of work done by the engine is with the use of a stoker and running up hill at a speed of 15 miles per hour, the assumption being in this case that there would be 15,000 lbs. of coal burned per hour, while running up the grade. The cost per 1,000-ton miles is less than if we attempted to run with half the load at the same speed up hill with only one fireman, and it is only 3 cents greater than if we went up the hill at six miles an hour with a single fireman. At ten miles an hour two firemen would give nearly the same capacity of the locomotive and at somewhat lower cost, but it is rather uncertain whether two firemen can be managed satisfactorily on a locomotive, and where a large amount of traffic is to be gotten over the road, the advantage of being able to push the engine to its full capacity and at a fairly high speed is shown without any uncertainty.

At 15 miles an hour, considered economical speed for general operation, one fireman could handle 19,000-ton miles at a cost of 25 cents, two firemen 28,000-ton miles at a cost of 22 cents, and the stoker 38,000-ton miles per hour at a cost of 22 cents. You will see, with a slight additional increase or cost of stoker over one man at slow speeds, a much larger amount of ton miles can be attended to, and at speeds of 15 miles an hour the cost of the stoker is considerably less than that of one fireman, and double the amount of ton mileage can be made with the engine.

The President—The Alton road has been experimenting, I believe, with a stoker. Mr. Maher, of that road, is present, and we would like to have any information on this subject which he can give us.

Mr. Maher—I would rather hear first from some of the representatives of other roads who have been on the Alton during the last 60 days, following the engines equipped with the stoker. Mr. Smith, of the Boston & Maine; Mr. MacBain, Mr. Webb and Mr. Foster of the New York Central Lines; Mr. Gossett, of the Iowa Central; Mr. Clark, of the Minneapolis & St. Louis.

C. E. Gossett (Ia. Cent.)—I witnessed the action of the stoker of the Chicago & Alton, and wish to state frankly that I consider it beyond the experimental stage so far as the principle is concerned. On the trip that I made out of Bloomington the consolidation engine was rated at 2,800 tons. The engine on this day had 3,300 tons, or 500 tons more than the rating, using mine-run Illinois coal. The fireman experienced no trouble whatever in keeping the engine hot, in fact he was at no time hurried about his work. The engine made an average speed of 17 miles an hour for a distance of 88 miles. In that 88 miles the fireman moved his grate slightly three times. On arriving at the terminus the fire was apparently as good as it was when we started, and the variation of the steam pressure throughout the trip was not to exceed 4 lbs. at any place. Another important factor to be considered in using the stoker is when the engineer started to shut off for drifting or station stop, on account of the fire being in such perfect condition there was very little blowing off, and, as stated before, when we arrived at Joliet, after being on the road about seven hours, the fire appeared to be in such condition that it could go on several times that distance without cleaning. I consider the stoker a complete success.

John Tonge (M. & St. L.): I was with Mr. Gossett on the trip referred to, and I think he omitted the most important part of the statement which he should have made—that is that the stoker did not receive any repairs for a month and that the determination was to let it run until it would quit the service, to see what would be the trouble, and how long it would run. The trip we made was successful in every respect. The steam gage did not move. As Mr. Gossett said, the normal rating was about 2,800 tons and they had 3,300 tons for that trip. I am positive that is about 200 tons short of what the engine could have hauled. They had increased the nozzle from 5¼ to 5¾ in., and the traveling engineer insists on another ¼ in. I was not looking much at the matter of coal saving under the conditions referred to. While it is a fact that even firing must necessarily save coal, when you can increase your tonnage 500, or 700 or 1,000 tons you can afford to use any amount of coal required by the engine, without giving the matter much consideration. After we reached Joliet, we took the Alton Limited and I noticed the same thing on the passenger engine; she fired perfectly satisfactorily and easy, the engineer with his head out of the window all the time, never bothering about anything, his ex-injector steadily working, and the run was satisfactory in every respect. The coal was going in very regularly. When we got to Chicago I examined the fire and I never saw a better. I asked the engineer how much further he could have gone with that fire. He said he could have turned back and gone to St. Louis without touching the fire.

H. T. Bentley (C. & N. W.)—As I understand it, the Strouse stoker is a hand-fired arrangement, and has no conveyor to carry the coal to the hopper. We experimented with

one of these stokers in the early days, but probably great improvements have been made in that time. Our men told us at the time we experimented with the stoker that they would rather fire by hand than handle the coal from the tender into the hopper. That was 12 or 18 months ago, and perhaps changes have been made in the stoker which would overcome the complaint of the firemen. Another objection we had to that stoker was the noise it made in operation. Our men said that with the stoker on the engine, if a torpedo went off and they did not hear it we should not hold them responsible. We took that matter up with the manufacturers and it is possible they have overcome the two defects mentioned.

Mr. Gossett—In applying the stokers to our locomotives I figured on raising the deck about 10 in., that is, the shovel sheet, which will make it easier for the fireman to elevate the coal into the hopper. As it is now, it is rather laborious for the fireman to reach down to the level plane where he is standing, which is necessary to get the proper swing for shoveling by hand firing, but by elevating the deck 10 in., the fireman can stand at his post with a straight back and that is not so laborious. The present machine runs as silently as a sewing machine.

The President—I wish to say one or two words in connection with this discussion. We are getting dangerously near the discussion of specific devices in the stoker situation. I think it should be understood, when we begin to discuss devices manufactured by one concern or another, that our members should feel at perfect liberty to condemn a machine, or at least tell us of its faults, or the things that are not in its favor, as freely as they do the things that are in its favor. When we get down to the stoker question, it is necessary for our own information to discuss specific makes of stokers, and if there is anything against the stokers our members should tell us of their faults as freely as if it was not a patented or special device. We know the stoker matter has been coming along for several years, and we have felt that it is still in the experimental stage, but perhaps the successful stoker has at last been produced, but if there is anything within the knowledge of our members that makes its success questionable we should hear about that fully. There can be little doubt that the stoker is going to be an important feature with us, especially in view of the introduction of new and larger types of locomotives, which are so generally coming into use. I would ask anyone who has any information on this question, or anyone who has experimented with the stoker to give us the benefit of his experience.

Mr. Maher—In the case of the first stoker we put on, we took it off the engine at the end of four or five miles—it did not work satisfactorily. We connected it up to a temporary firebox and worked on it for almost a week and got it operating all right. We then put it back on a locomotive and it has been in constant use ever since, about 60 days. We have now 12 engines equipped and two more engines being equipped this week and five more engines to be equipped next week, which will make a total of 20 engines. We have had some little trouble with the type of packing used on the piston in the end of the stoker where the steam cushions. When that gets to blowing it takes away the cushioning in the cylinder. and we have had one or two failures on the road, but we are putting a tandem metal packing in the piston now, which we are satisfied will overcome that difficulty. One other feature is the condensation from the steam pipe will have to be taken care of and kept out of the cylinder. We are overcoming that by having a valve to let the water out.

We ran a consolidation engine, 22 in. x 30 in. cylinder, from Brighton Park to East St. Louis, a distance of 276 miles, without cleaning the fire. There was practically no stop, the train going through in 12 hours and 25 minutes. On the arrival of the train at the terminus the road foreman and the roundhouse foreman advised that the fire was in good condition and the engine could have gone over another division without attention to the fire. We have had one engine in particular working between Chicago and Brighton Park, on heavy tonnage trains, where we handled 3,500 tons, and we have made that distance of 122 miles from Bloomington to Brighton Park in from 7 hours and 15 minutes running time to 9 hours, as conditions may warrant.

We have also used the stoker on a Pacific type passenger engine, 23 in. x 28 in. cylinder, and have handled as high as 14 cars without any difficulty, maintaining 200 lbs. easily with the stoker. If no unfavorable developments occur it is the intention to equip all our heavy locomotives with them.

F. H. Clark (C., B. & Q.)—It has been hoped by many of us who have been watching the development of stokers that when we finally found a satisfactory stoker, one that would keep the coal fed properly, and possibly make a saving, we would also have the advantage of smokeless firing. I should be glad to know what kind of a record the Strouse stoker is making as to smoke.

Mr. Maher—I do not think you are going to get smokeless firing with a stoker to the extent we hoped, for the reason that it is so different from hand-firing that there will be more continuous production of smoke in the firebox than where the firemen puts in a load and lets it burn out at intervals. The stoker sprays the coal into the firebox all over the grate surface, and much of that commences to burn before it reaches the surface of the fire. For that reason I do not think we will get away from smoke.

W. McIntosh (Central of New Jersey)—Can brick arches be used in connection with mechanical stokers?

Mr. Maher—We do not use the brick arch. It would depend on the height of the arch from the grate surface.

The President—With the Strouse stoker is the firing dependent upon perfectly uniform distribution all the time?

Mr. Maher—It is a uniform distribution.

The President—You cannot vary this spray?

Mr. Maher—You do not need to. It distributes the coal over the surface evenly.

The President—But suppose you want to direct a little extra coal to one place, can you do that with the stoker in the back corner, for instance?

Mr. Maher—It will put it in the back corner of a 66-in. box, and it put it in the corner of a 75-in. box in a test. The amount is controlled by the fireman's adjustment of the lever of the stoker.

J. F. Walsh (C. & O.)—The stoker can be used in connection with a brick arch. We are experimenting with the Strouse stoker at this moment, but have not gone far enough yet. It is working with a brick arch.

Mr. Curtin (Louisville & Nashville)—I would like to ask what percentage of ash the coal on the Alton contains. I should judge that the stoker is burning some very good coal. How does it work when the firebox begins to fill with ashes and other impurities?

Mr. Maher—We haven't experienced any trouble with the coal we are using, through having the firebox fill up. Of course, local conditions will enter into the efficiency and practicability of the stoker in different parts of the country.

D. R. MacBain (N. Y. C.): Two weeks ago I made a trip of 122 miles on a consolidation engine on the Alton. The engine was 22 in. x 30 in. and had 33 sq ft. of grate surface. We had 3,305 tons, 63 cars, and made the run, deducting delays, from Bloomington to Brighton Park, 122 miles, in 6 hours and 17 minutes. In starting out we smoked, and at the first stop I observed that the fire was very light, only 2 or 3 in. in some parts of the box. Then the fire was built up to 6 in. all over, and from that station on the engine seemed to work perfectly. It was absolutely within the control of the fireman to place the coal where he wanted it. The last 40 miles, from Joliet to Chicago, was at a speed of 22 miles an hour, and when we got to Chicago I again looked at the fire, which had not been touched from the start, and there was very little ashes in the pan and the fire was clean and ready to start back with. Considering we had burned about 20 tons of coal in that section of the country and had an abundance of steam all the way, I consider it a very good record.

Mr. Crawford—The whole stoker situation as I see it resolves itself now into a fairly successful overfeed stoker, and experimentation with two designs of underfeed stoker. One of the underfeed stokers is on the Burlington and the other is being tried under my direction. It has been in service on one of our freight engines, in the hands of a regular crew, for a little over two months and made in that time about 6,400 miles.

The stoker has what I call a seventy-five per cent. job. We have got to fire about twenty-five per cent. of the coal by hand. On a through train the amount of hand firing is reduced; on a slow freight, put on sidings from time to time, the fire must be built up by hand. The only point we have actually determined regarding the stoker has been the smoke proposition. We find with readings on Ringelmann's charts that a hand-fired engine with proper tonnage for its class, fired as carefully as we can, makes an average smoke reading of 2.7. The stoker engine on a run where eighteen per cent. was supplied by hand, made a smoke record of 0.9.

It is the intention to put an engine equipped with this stoker on the testing plant at Altoona, and also some other stokers as opportunity offers. We therefore hope to be able to give the committee and the Association next year more data as to the working of these stokers.

The President—It is a standing committee, Mr. McIntosh.

The next report was on revision of standards.

Discussion on Revision of Standards.

The President—It will be necessary to take some action on these matters. The first few paragraphs refer chiefly to

clerical errors and can be handled by direct vote of the Association, without ballot.

The paragraph regarding vertical clearance in journal bearings would have to be handled by a committee, or by a communication with the Master Car Builders' Association, for the sake of obtaining uniformity.

The letter from the Association of American Steel Manufacturers demands our action. We should take that matter up seriously and see if we cannot get away from the terrible muddle in the sheet metal and wire industries.

Mr. Wildin—Regarding the change of clearance from 1-16 to ⅛ in., that was put in at my suggestion, and I made the same suggestion to the committee of the Master Car Builders' Association. I move that this matter be taken up with the executive committee of the Master Car Builders' Association, and that we recommend the adoption of the change.

Motion carried.

The President—What action do you wish to take upon the letter of the Association of American Steel Manufacturers?

F. H. Clark (Chicago, Burlington & Quincy)—I do not fully understand what they are recommending. Their recommendation, I suppose, is made clear from the booklet which was to accompany the letter, but which we have not here.

The President—Mr. Wildin has not a copy of the booklet. Mr. Rosing appears to be the only member of the committee that has a copy.

Mr. Crawford (Pennsylvania Lines)—I have not a copy of the booklet, nor have I seen it; but as I understand this proposition it is this: We have in the master mechanics' decimal gages something we call 0.125. As a matter of fact, the manufacturers make it 0.135, and therefore when we order 0.125 we get 0.135. I understand the idea that has been presented to me was that we should change our method of ordering and order 0.135. We agreed in one of our specifications recently, where we stated we wanted 0.125 used. As a matter of fact, it would be a special size for us. The manufacturer was making 0.134, and therefore he wanted us to change these specifications and order the commercial product.

The President—It appears that the Association of American Steel Manufacturers has decided on certain sizes which are to be ruled.

Mr. Crawford—That is my understanding.

The President—But they are not to call for arbitrary gage names, but 0.135, so that when we order a wire we are to know that we get a definite size, and not a number. It appears to me we would be doing a useful thing in co-operating with them in getting this new gage used.

Mr. Seley—Should we not change our gage to correspond to their standard sizes?

G. R. Henderson (New York)—I was chairman of the committee that originally proposed that gage and also a member of the general committee. The question was taken up with the manufacturers at that time and everybody agreed in the suggestion to co-operate with the work; so if the manufacturers are to take up the sizes I think they are remiss too. I think the manufacturers should help to make those standard sizes if the members order them. I believe they still order by gage instead of the decimal size.

The President—Isn't the trouble due to the fact that the members of the Master Mechanics' Association have only to a slight extent adopted their own gage?

Mr. Henderson—That is the trouble. We started this and then did not carry it out.

The President—As we have not carried out onr own recommendation and as this American Association of Steel Manufacturers is an important body and able to control the rolling and the drawing mills, should we not co-operate with them?

Mr. Henderson—I move that a committee be appointed to reply to this letter of the American Steel Manufacturers' Association, ad request them to appoint a committee to meet and discuss it.

Motion carried.

The President—That will be a recommendation to the Executive Committee. There will be two more recommendations of this committee on which some action should be taken. I suppose the last portion of tne report, in relation to the appointment of committees, should be referred to the Executive Committee for action.

Mr. Maher—The subject of safety appliances for locomotives is something we should look into very carefully. A number of states require that a road engine temporarily in switching service should have suitable steps, grab irons, etc., and we have not decided which is the best step to apply to a road engine temporarily in switching service. We frequently have to put a road engine in switching service where we have few facilities for taking the pilot off.

Mr. Johnson—I move that the suggestions of the committee on the Revision of Standards dealing with this subject be referred to the Executive Committee for their consideration.

Motion carried.

The report on Motor Cars was then presented.

Discussion on Motor Cars.

After reading the report Mr. Fuller said that it was thought, as this work was retarded, and tne committee was not able to get out circulars, that a good deal of information could be obtained from the members on the floor to-day, which, if the committee were continued, or a new committee appointed, would help the committee in its work of preparing a final paper for next year.

C. A. Seley (C., R. I. & P.)—The Rock Island has not gone into the gasolene car, except in the case of a very small type of car which we have under experiment at the present time. It is not exactly a motor car, but a special type of car for a small special situation.

For branch line operation we have tried two different types of steam cars; the result of one experiment not being satisfactory, the car was returned. We have at present a steam motor car that is more advanced, but I am not prepared to say that we have obtained absolutely satisfactory results at this time. It seems to me the success of a steam motor car or the gasolene motor car depends upon operating conditions rather than on mechanical features, and thus far the Rock Island has found difficulty in placing a motor car where it could meet with continued service that would be satisfactory from the transportation standpoint.

The President—I might say, gentlemen, that we have had some experience with the motor car. Before we got a motor car, the passenger business of the road depended on our developing a motor car. After we got a motor car we could not find any place in which we wanted to use it. That has been our experience for the last three years. Personally, I do not believe, unless the gasolene motor car can be made a satisfactory car, that there is anything in a motor car for railway service. The whole matter of the combining of a steam engine in a passenger coach is, to my mind, radically wrong. The proper place to put a passenger coach at night is in the passenger car yard. The proper place to put a steam engine at night is in the roundhouse. If you put a passenger car in the roundhouse, which is full of smoke, the car becomes dirty and grimy and you have got to send your car cleaners from the car yard to the roundhouse to clean the motor car. If you put the car in the passenger car yard, that means that you must send your men from the roundhouse to tne passenger car yard to repair the engine.

There is nothing radical about a motor car. It is simply a small steam engine; it takes about as much coal per mile as any other engine, possibly a little more; it is easier to fire, because it is small; and its capacity is limited.

We have had cases where our people thought the motor car should pull two or three trailers with ease, and the car will not do it. It is simply applicable for a light service, which, in most of our conditions, which are, of course, rather different from those further south, can be handed by mixed trains better than they can be by motor car service. You must, in the majority of cases, run three men, an engineer, a fireman and a conductor, and it seems to me that a very much better solution of the question is to build a little tank engine with a baggage compartment on it, in which you can get a fireman to attend to the baggage and let the conductor look after the tickets. We have prepared designs for such a car, and now await the passenger department to find a place where they want to run it. The motor car question is going along very quietly with us and we are not spending any money on it.

Angus Sinclair—I have just returned from a trip I made to Omaha, where I examined the motor car which the McKeen company is building for the Erie. I have had considerable experience with the running of automobiles, which is a good way of working up towards gasolene railway motors. I have found gasolene automobiles as nearly perfect as anything you could expect in the mechanical line. One peculiarity about the gasolene motors was that the designers seemed to think that they would never need any repairs. They designed them so it would take you half a day to get a screw out—one of the kind of screws that is always getting loose. But I find in the later cars that they have learned a good deal of what the locomotive men did in the early days; namely, that it was good to make a machine which was easily repaired.

What struck me about the machine I examined at Omaha, the latest development of the McKeen company, was the great care that had been taken in having each part so that it could be readily taken apart and was easily get-at-able. That will prove a very important help in working up the popularity of that sort of a motor. The power seems to be ample for the kind of service for which it is designed.

Another thing about it was the arrangement of the engines. What made the marine engine a real success was the vertical putting the cylinders and mechanisms above the crank-shaft

so that everything was within reach and so that the power was applied directly where it was wanted. The same thing has been adopted in the mechanical motor. They have put the cylinders up above and have all the working parts precisely the same as the vertical inverted marine engine. Another thing—they have a very good air starting arrangement. The ordinary automobile causes difficulty in starting, especially in cold weather when the combustible is cold. This arrangement with the air pressure gives a few turns and I do not think there will be any difficulty at all with that machine in starting it in any weather or under any conditions. I think, gentlemen, so far as the branch lines are concerned, that are operated at a great expense with locomotives at the present time, that the gasolene engine will give very satisfactory results in the near future.

H. W. Jacobs (A., T. & S. F.).—About two months ago the Santa Fé, after looking around for cars, concluded to get two of the McKeen motor cars. One was put into service in Southern California, making the loop running from San Bernardino. I had occasion to go out there some two or three weeks ago and both the master mechanic and the transportation department, spoke very favorably and enthusiastically over the performance of the car. It has developed a profitable passenger business, and we have had very little trouble in operation. We have one in Southern Kansas and it also has developed a profitable passenger business and the repairs have been low.

C. B. Smith (B. & M.).—It seemed to us on the Boston & Maine a short time ago that the motor car ought to have a field on such a road as ours, where the distances are short and a large number of branch lines intermesh with each other. Some study was given to the subject, but under the conditions of many grade crossings, etc., it did not appear that there would be any economy in the operation of such a motor car or cars. With the competition of electric service it is desirable that such motor cars should run frequently, which, of course, they cannot do under their present design. It appeared to be an essential feature of such a car that it must be turned around, and hence the maintenance of existing turntables, or new and larger ones, or the installation of Y's in order to turn the cars. There seems to be no motor car developed that can be operated from each end of the motor, and in my opinion that will be an essential characteristic of the future successful motor car, at least under such conditions as exist in some parts of New England. I do not recall having seen any allusion made to this condition, but think it would be well for the committee to take it under consideration. Further, there does not seem to be any diminution of the number of operators possible, especially under state laws, whereby the cost of operation could be reduced.

E. I. Dodds (Erie)—We have been operating on the Erie one of the McKeen motor cars for about a year. We ran it from Newburgh to Turner's Junction, about 14 miles. The grade going from Newburgh is very steep, being at some places 90 ft. to the mile. The car always ran on schedule time, and its operation was very satisfactory. It is operated now on the Rochester division, giving entire satisfaction. It has been running, in all, for about two years. I think the future of the motor car is great. We have been working for eighty years on the steam engine, and we are just beginning to get it about right; motor cars, those of the gasolene type particularly, are rapidly reaching a point where the difficulties of operation are being solved, more rapidly in the case of the gasolene than the steam car.

Mr. Fuller—The remark was made that the passenger department of one of the roads, after it got a motor car, wanted it to haul a train. What Mr. Vaughan said is true, the motor car is not built to haul a train. It will haul a trailer, but if you are going to put a train on the motor car you had better put a steam train on the road in the usual way. It is a fact that the motor car fails, and when anything happens to a motor car the statement is made "She is going to pieces." If it were a locomotive which had the difficulty, nothing would be said about it and the locomotive would be sent to the roundhouse for repairs and another locomotive would be put in. The motor car must receive attention. You cannot make runs from 7 o'clock in the morning until 10 o'clock at night expecting the car to make the same run the next day and do this for 365 days a year without giving the car some attention any more than you would think that your automobile would be in a position to do this work. You must give the same consideration to the motor car that is given to the steam locomotive, and if you do this there is no reason why you should have any particular trouble. The motor car, however, should be put on branch lines or in sections where the greatest return for the money will be made. It should not be put in between two or three express trains.

The topical discussions which were to be taken up next were postponed to the following day.

E. D. Nelson (Pennsylvania Lines) then presented his paper on Bank vs. Level Firing.

Discussion on Bank vs. Level Firing.

The President—I consider we are privileged to obtain a paper of this sort. It gives us information that a few years ago we could not have obtained by any means, and it is important in enabling us to get reliable information as to the value of these different methods of firing.

J. F. De Voy (C., M. & St. P.)—It appears to me that the question of bank or level firing depends entirely on the design of the firebox. A level firebox will require more of the level firing, and a sloping firebox will require what is called here the bank system. About five years ago, when we were beginning to construct heavy locomotives with narrow fireboxes, my attention was first directed to the so-called bank firing. Level firing in that boiler appeared impossible. I have seen the best firemen fail in their efforts to fire that boiler by the level system. We finally came to the conclusion that the way to fire that boiler was to drop the coal just inside the fire door and let it distribute itself, and it will distribute itself. The same plan worked successfully on a 60-in. wide box with about the same drop.

In regard to the effect of heat at the fire door on the fireman, that is governed entirely by the distance of the top of the grate from the bottom of the fire door.

H. T. Bentley (C. & N.-W.)—I do not entirely agree with Mr. DeVoy. I do not think the design of the firebox has so much to do with it as he says. I think practically the thing having the greatest effect on the matter of the bank or level method of firing is the character of the coal used. I have known engines to be fired with the bank method of firing, which was the only way you could handle them. That was 30 years ago. In Great Britain, with the South Wales coal, the only way to feed an engine was to fill the firebox and have the coal taper off toward the front, while Northwest Wales coal used this way would kill the same design of engine. Therefore, it is not so much a question of the design of the engine as the kind of coal you are using.

C. E. Chambers (Cent. of N. J.)—I quite agree with Mr. Bentley. I did all my firing in the Middle West, and was considered a good fireman. I always fired with the level method. I came to eastern roads in 1901 and found that the men were firing with the bank system. I thought I would break that up and have the men fire by the level method; but the engines would not steam. It was necessary to fire with the bank system to get successful results.

Mr. Crawford—To give the association a little idea of what led to these tests: We have on the Pennsylvania Lines, East and West, about 1,800 engines. A great majority of them are fired with the level firing. They are fired with all of the coals used on the lines in the eastern territory, out to the extreme western end of the road, including Indiana and Illinois coals. But of the 1,800 engines I think I am quite safe in saying that 1,600 of them are fired with level firing. The level firing has always been so successful in those engines that when some of our men proposed to fire them with bank firing our road foreman of engines objected to it. Our firemen had been brought up to the other way of firing. The attempts to fire them were met with difficulties from a number of kinds of coal. One firemen on his trip would use a bank fire and the other a level fire. The road foreman of engines brought the question to me. I was born a level fireman, just as I was born a Republican, and I decided that level firing was the proper way to fire a locomotive, but I was not satisfied with my own decision and I asked Mr. Gibbs if he would try to test it out on an engine. In one test it represents a coal used in the East and the other a coal from the West, used on our western lines.

Angus Sinclair (Ry. & Loco. Eng.)—When they first started to use coal in place of coke in Great Britain much attention was paid to smoke prevention, and one locomotive superintendent advocated a grate with a slope of twenty-five per cent. and introduced bank firing. It was well adapted to the qualities of Welsh coal, but a practice suitable for one coal is sometimes entirely unsuited to another. A great many of the locomotive superintendents in Great Britain followed this lead and slope fire grates were introduced to a great extent, but they did not give satisfaction unless with special coal, and the consequence is that level firing became the firing of the British Isles.

Mr. Chambers—Is there any noticeable difference in clinkering between level and bank firing?

Mr. Johnson—In these tests we did not obtain the amount of clinker and ash separately as we had in other cases, but from general observation I should say there would be no difference.

This subject was not entered into for the purpose of trying sloping and level grates, or to determine questions as to large or small ratios between heating surfaces and grate areas; but

it was a definite question to settle, as Mr. Crawford has explained. How the tests affect other modifications of grate area and heating surface we cannot say positively, but from general observation, with this test, and the conditions there, and with the type of locomotive used, as well as the Atlantic locomotive, and over 60 different kinds of coal, tried at different times, it seems to be the general conclusion that each square foot of firebox should give a definite proportion of work. The coal per square foot of grate is larger in front than in the back, and we think that with these forms of grate which we have used, with uniform burning over the surface of the grate, and, therefore, approximately, level firing, they produce the most desirable results.

The President—We hope the splendid results supplied on this occasion will be followed by others in similar papers from the Pennsylvania.

Conventionalities

No convention would be complete without Mr. and Mrs. D. C. Noble. They arrived on Tuesday.

F. T. De Long, Second Vice-President, and G. N. Sweringen, of the Chicago Railway Equipment Company, arrived Tuesday to attend the conventions.

Messrs. Elliott Curtis and M. B. Brewster, of the United States Metallic Packing Company and the American Locomotive Company, Philadelphia, Pa., are stopping at the Traymore.

Among the newcomers this year are the seven leopards and the fifteen Shetland ponies. Both families have been well received in pier society, but owing to mutual jealousies their friends have found it necessary to keep them separated.

Tuesday afternoon a man in Atlantic City completed the electrification of his railway from start to finish in ten minutes. It was the first part of the big electric sign, "Railroad Age Gazette." He put in the lamps and connected the wires.

On Tuesday afternoon a special train over the Central of New Jersey brought members of the New York Railroad Club down to the conventions. The party, including ladies, amounted to about 200, under the auspices of William McIntosh as pilot.

Prominent among the aquatic exhibits this year are the seals and the wave motors. The seals bathe on the pier exclusively, but the wave motors have grown too old for that, and have taken to the water this year. The editor has not yet seen either exhibit at work.

For the benefit of convention attendants with long memories who think they recall that the numbers on the telephone boxes are the same as last year, it is perhaps well to state that before announcing the number as 251005 it will be well to drop in a 25-cent, 10-cent or 5-cent piece and then take another look.

John Chamberlain, formerly Master Car Builder of the Boston & Maine, and now taking it easy, appears this year with a neat and serviceable cane in place of the famous umbrella which he was wont to employ to ward off the attacks of spring water when the conventions were held at Saratoga. John always said he could stand water on the side and didn't mind his clothes, but when it came down straight he needed his umbrella.

William Marshall, president of the Anglo-American Varnish Company, for the first time in his long record of conventions appears this year with some evidence of being a sorehead; but he admits that he didn't bump his head in crawling under his automobile and he doesn't blame anybody. He consoles himself with the philosophy of his forbears, who used to say with reference to such things as toothache and corns: "Hoots, mon, it's far frae your hairt; it'll no kill ye."

Mrs. R. D. Smith is attending the convention this year for the first time, with her husband, who is now superintendent of motive power of the Boston & Albany, with headquarters at Boston. For some years—in fact, as soon as he could bring it about after 1895—Mr. Smith has been gradually working his way as far as possible from Lincoln, Neb. It is hoped that the event of three years hence will not cause him to make another jump toward the East, for the Atlantic is wide and the water is wet.

It appears, from the activity displayed by the representatives of manufacturing houses in getting their exhibits together and the magnitude of the exhibit, as a whole, on the heels of a departing business depression, that they feel like a certain Uncle Zeke, who was reproached for working when the weather appeared unfavorable for a crop. "Well," replied Uncle Zeke, "yo' sees it's just dis a-way. Season's bad, 'n' my wants is few, but ravens is scurser 'n' 'ey used ter be, 'n' Ah gotter eat."

George Groobey is confidentially announcing in the starboard ear of a few picked friends that Atlanta having been lawfully declared a dry borough, he has secured a lease on a peculiar grade of Georgia spring water which will be put on approbation at his home office, the booth of the Buckeye Steel Casting Co., Columbus, Ohio. The spigot was driven at sharp 7.30 a. m. Tuesday and "Old Grube" declares that this sparkling liquid drives skeletons from their feasts and paints landscapes in the brain of men. No rain checks.

The offices of the *Railroad Age Gazette* are in substantially the same location as in previous years, the staff of the paper is prepared to do substantially the same work as heretofore, and then some of its representatives expect to meet substantially the same people and some more, its editors desire and expect to receive from their friends the same substantial assistance in their work that they have heretofore received and a boost or two on the side, and—but what's the use? It's a substantial proposition all the way through, and then——. (Printer will please stop here).

W. O. Huntley, president of the Chicago Pneumatic Tool Company, was scheduled to arrive from Europe yesterday on the "Kaiser Wilhelm der Grosse," and will later appear at the conventions. This is the first time that W. O. has appeared under the burden of the presidential office, having succeeded his brother, J. W., since last year. It has recently been learned why it has always seemed desirable for the president of this company to arrive from Europe on the day before the convention opens. It is because it is, 'most always, Tom Aldcorn's birthday and there are "doings."

H. H. Vaughan, President of the Master Mechanics' Association, wearing his honors modestly, as he has all of those which have come to him earlier in life than to most men, was a caller at The Daily offices on Tuesday. With his never-ending desire and unlimited capacity for hard work, it is to be regretted that to all appearances the work of the present convention will neither satisfy the desire nor fill the capacity. However, Mr. Vaughan has one consolation: He is high in the councils and the exploits of the McBarmma Golf Club, which meets annually on the links which happen to be most convenient. His opponents should watch out.

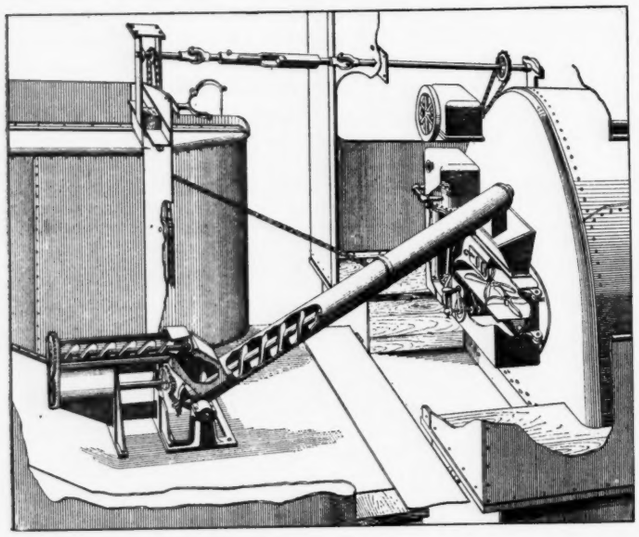
George M. Basford, assistant to the president, American Locomotive Company, came in on Tuesday. Mr. Basford has, during the last several months, devoted himself to the general good of the causes represented at these conventions by serving as secretary to the Railway Supply Manufacturers' Association, which has endeavored, apparently with success, to dispel some of the gloom cast over railway and kindred interests by too much and too foolish legislation. A long period of service in the newspaper business seems to make it necessary for a man to keep busy. If there is no business, then he must make some or know the reason why.

MECHANICAL STOKERS.*

The Victor, Crosby, Strouse and Hayden stokers were described at the last meeting of the association. The committee has been advised that further development and extended use of the Victor and Crosby stokers has ceased. It has investigated, as far as possible, all types of mechanical stokers which have reached an interesting state of development, but, with the exception of one stoker, has been unable to procure any figures of tests.

The Strouse overfeed stoker, as manufactured by the American Automatic Stoker Co., is now said to be at a marketable stage, 22 of them having recently been furnished to the Chicago & Alton and two to the Iowa Central. It is hoped that in the near future there will be available data covering practicability and efficiency; but as yet the committee has been unable to procure any data of value on the subject, the tests, apparently, having been more on the order of proving the mechanical possibility of the apparatus and observing the effect on the reduction of black smoke.

The Pennsylvania Railroad is developing an underfeed stoker of its own design, which so far seems to give promising results, but there is no data at hand showing its performance. This stoker uses coal up to sizes of 4 or 5-in. cubes, and requires no change of the locomotive other than the application of a special form of grate. The application of the mechanism is such that the fire door is in no way obstructed, so that hand firing may be resorted to on the road without any change or removing of apparatus. At present the coal is shoveled from the tank to the hopper of the stoker, but it is intended to install some means of mechanical conveyance.



Black or Dodge Stoker.

The Barnum underfeed stoker of the Chicago, Burlington & Quincy, requires screenings of one and one-half inches. The application of this stoker is such that hand firing cannot be accomplished without changes such as to require the work to be done in the shop. The installation of the stoker necessitates the removal of the grates, extension of the back frames and the remodeling of the ash pan and draft appliance in the front end. The distribution of coal in the firebox is such as to seldom necessitate raking of the fire. With this stoker also the coal is delivered to the hopper by hand, but it is the intention to make this automatic later.

The Black or Dodge stoker, which is being developed on the Erie, is of the overfeed type. The only change to the locomotive necessary to the application of this stoker is the replacing of the firebox door by a specially designed box-shaped door, in the center of which is a pivoted shelf which can be tilted to any angle to the plane of the fire by means of a lever at the front of the door. Two four-blade gears revolving at about 250 r.p.m. on the top of the shelf spray the coal over the fire as it falls on the shelf from the hopper, which hopper is attached to the top of the door and forms a part thereof. The distribution of the coal is controlled by tilting the shelf and thus directing the spray of coal to any desired part of the grate. The whole operation can be observed through peep holes in the fire door. The coal is conveyed to the hopper by a worm conveyor extending from the forward end of coal space in the tank to the hopper, coal being delivered to this worm from the full length of the coal space by means of another worm. In order to fire by hand, the front worm conveyor is thrown back on its hinge and secured to the tank; the door requires no change, being all in one piece and hinged on the original fire-door hangers; it can be operated similarly to the ordinary door. The size of coal for which this stoker is adapted is everything that will pass through a 3 or 4-in. screen.

A number of tests have been made of the Hayden automatic stoker, in use on the Erie, condensed tabulated results of which follow. While the results of the test were not favorable to the stoker, its possibilities were felt to be such as to warrant the construction and placing in service of five more. It is evident that the operation of the stoker will be best shown by comparison of the equivalent evaporation per pound of combustible and the combustible-hours per ton-mile, which latter item takes into consideration the time in which the run is accomplished. From the data it is seen that engine 1627, which made the first test in April, 1907, showed .734 per cent. more equivalent evaporation per pound of combustible with the stoker, while engine 1653 in the second test, made in April, 1908, showed 11.16 per cent. less. The fuel used with engine 1627 was run of mine, the lumps being broken to about 3-in. size by the fireman, to suit stoker requirements; whereas engine 1653 was furnished with coal passed through a 3-in. screen, resulting in the latter containing a very large proportion of fine coal, which would affect the evaporation per pound of combustible. While the combustible hours per ton-mile takes in, to a certain extent, all the varying conditions which make it impossible to obtain two similar results of like tests, it is of fairly good comparative value. With engine 1627, the stoker showed a loss of 17.02 per cent., while with engine 1653 the combustible-hours per ton-mile was only 8.7 per cent. greater with the stoker.

Although the stoker might show an increase in fuel consumed per ton-mile, as the provision of automatic firing would induce the engineer to work the engine harder, since firemen's labor and endurance were not concerned, it was felt that the time on road would thus be reduced and economy shown in fuel-hours per ton-mile when used as a basis of comparison, but the results were not as anticipated.

The committee directs attention to the fact that automatic stokers are in their infancy, and it should be realized that efficiency over hand firing could hardly be expected at such an early stage. It furthermore feels that the tabulated results hold out great hopes for the future, particularly as the question has been taken seriously by a number of railways.

The gradual retirement of old cars with structural weaknesses, and the advent of improved draft gears and triple valves, render it possible to increase train length without resultant troubles from trains parting; consequently it is reasonable to assume that the average tractive power of locomotives will increase. It is within possibilities, therefore, that the increased fuel consumed per mile will render it advisable to provide mechanical means for firing locomotives in order that they may develop a high sustained tractive effort and render the service attractive to men who possess qualifications to become successful locomotive engineers.

A successful automatic stoker should render locomotive firing more attractive, raise the standard of the service, permit close attention to economic handling of fuel and reduction of black smoke, enable firemen to become better acquainted with the general duties of a locomotive engineer, and reduce tube and firebox troubles.

Test on Hayden Automatic Stoker on Erie Railroad.

Engine	No. 1627	No. 1653
Size of cylinder	22 in. x 32 in.	22 in. x 32 in.
Number of flues	380	380
Size of flues	2 in.	2 in.
Size exhaust nozzle	4 1/8 in.	4 1/8 in.
Heating surface	3,358 sq.ft.	3,358 sq.ft.
Grate area	54 sq.ft.	54 sq.ft.
Kind of valve	Richardson balance	Richardson balance
Type of boiler	Wagon top.	Wagon top.
Type of firebox	Wide	Wide
Rated steam press.	200 lbs.	200 lbs.
Diameter of drivers	62 in.	62 in.

	Firing on 6 trips		Diff., in %, hand	Firing on 8 trips		Diff., in %, hand
	Hand.	Auto.	firing.	Hand.	Auto.	firing.
Av. running time, hrs	4.756	5.052	.....	5.884	6.26	.....
No. of miles in run	139.7	139.7	.....	139.7	139.7	.....
Average ton-miles	171,942	160,943	.....	244,382	261,035	.....
Ton-miles per hour	36,150	31,800	.....	41,600	41,900	.....
Average steam pressure	196.5	191.7	.....	193.4	195.4	.....
Fuel consumed, lbs	20,275	20,688	.....	21,709	23,287	.....
Water evaporated, lbs	114,816	126,410	.....	151,175	146,562	.....
Do., per lb. fuel, lbs	5.687	6.0998	7.26	7.007	6.314	9.88
Do., per lb. fuel, per hr.	1.196	1.207	.92	1.196	1.011	15.47
Weight of ash	698	527	.....	2,134	2,040	.....
Per cent. ash	3.46	2.53	.....	9.82	8.74	.....

*Report presented at the annual convention of the American Railway Master Mechanics' Association. Committee: T. Rumney (chairman), D. F. Crawford, C. E. Gossett, F. H. Clark, George Hodgins.

	Firing on 6 trips		Diff., in %, hand firing.	Firing on 8 trips		Diff., in %, hand firing.
	Hand.	Auto.		Hand.	Auto.	
Lbs. combustible consmd	19,577	20,161	.....	19,575	21,248	.....
Lbs. water evap. per lb. combustible	5.887	6.261	.....	7.77	6.92	.....
Av. temp. feed water, °F.	39.8	41.24	.....	67.63	67.6	.....
Lbs. water from and at 212°F.pr lb. cmbstble	7.632	7.688	.734	9.387	8.339	11.16
Rate combstble pr sq. ft. htg surf., per hr., lbs.	1.003	.878	.....	1.102	1.112	.....
Lbs. water per hr. from and at 212 °F. per lb., combustible	1.538	1.525	.845	1.64	1.335	18.59
Rate combustible pr sq. ft. grate area pr hr.-lbs.	63	55.2	.....	68.55	69.18	.....
Eq. evaporatcd, per sq. ft. heating surface.....	8.97	9.15	.....	9.57	8.46	.....
Lbs. coal used pr ton-mls	.1179	.1285	8.99	.0889	.08940	5.63
Do. water evap.,ton-mls	.686	.821	.....	.619	.562	.....
Fuel-hrs. per ton-mile...	.5609	.6494	15.77	.528	.5602	7.15
Combustible hrs. ton-mle	.5637	.6597	17.02	.472	.513	8.7

NOTE.—Fuel and water consumed during detentions are not included.

REVISION OF STANDARDS.*

The committee recommends that the following corrections be made in the proceedings published by the association for the year 1908:

Under the heading of Hexagon Bolt Heads, page 363, the thickness of the rough head for a 2½-inch bolt, shown as $1\frac{5}{8}$ inch, should be $1\frac{11}{16}$ inch, and the thickness of the head for the finished 3-inch bolt, shown as $2\frac{5}{8}$ inch, should be $2\frac{5}{16}$ inch.

On the top of page 366 reference is made to Plate 15. This plate has been omitted from the last proceedings, and should be inserted and correspond with Plate 12 of the Master Car Builders' Association, in which event the drawings for maximum flange thickness gage and wheel defect and worn coupler limit gage, shown on Plate 14, can be eliminated, inasmuch as they will appear on Plate 15.

On page 368, the first line of text should read—from 9 to 10 "square" inches, instead of inches and in the second line should read—from 5¾ to 6 "square" inches, instead of inches.

On page 406, the thickness of metal for 9-inch pipe should read—0.344 inch instead of 0.364 inch.

On the table of dimensions for Standard Pipe Unions adjacent to page 406, there appears the note—"Number at head of columns above are those given in the dimensions line on table 'A'". This table "A" refers to a diagram of the pipe-union as shown adjacent to page 284, in the proceedings of 1902, and it is recommended that this table be published in the proceedings for 1909, following the dimension sheet for Standard Pipe Union.

It is recommended that the vertical clearance between the side lugs of the journal bearing and the journal bearing wedge for standard 4¼ by 8 inch and 5 by 9 inch journals, be increased to ⅛ inch, as with the rough castings used in these articles the present allowance of $\frac{1}{16}$ inch is scarcely sufficient to satisfactorily overcome the irregularities of manufacture. Attention is also called to the fact that ⅛-inch clearance was heretofore adopted for the 3¾ by 7 inch and 5½ by 10 inch bearings and wedges, and we believe it should be the same for the 4¼ by 8 inch and the 5 by 9 inch bearings and wedges.

The committee quotes in full a letter received from the Association of Railway Steel Manufacturers, with reference to the use of decimal gage for sheet metals as adopted by the convention in 1895. The letter says that many railways still order sheets, tubing, etc., by arbitrary numbers instead of decimal gage. There are a number of gages now in use for measuring sheet metals based on a numerical system, for which there is no check gage. The thickness of sheets ordered by the Master Mechanics' Standard Decimal Gage can always be checked by a micrometer caliper, so there should be no practical opportunity for error or misunderstanding, and the committee urges the early adoption by all of its members of the Master Mechanics' Standard Decimal Gage in ordering sheet metals.

It further recommends that committees be appointed for the ensuing year to report on the following subjects:

1. Safety appliances for locomotives: This to include grab-irons, steps, handholds, uncoupling levers, etc., for engine and tender in both yard and road service. As legislation in some states is inclined in this direction, it is believed that the Association should take the initiative to furnish a guide for future legislation that will tend to secure uniformity.

2. To revise the present instructions relating to air-brake and train-air signals, to meet the requirements of the recent improved developments in air-brake construction and practice, for both locomotives and trains.

*Report presented at the annual convention of the American Railway Master Mechanics' Association. Committee: W. H. V. Rosino (chairman), T. W. Demarest, C. B. Young, E. T. White, G. W. Wildin.

MOTOR CARS.*

The following is a progress report, covering, in a general way, the development of motor cars on steam roads during the last two or three years.

Motor cars may be divided into three general classes, as follows:

1. Steam motor cars.
2. Internal combustion motor cars.
3. Electric cars in combination with storage battery, or with one of the above prime movers.

Within the last three years the general trend has been toward the internal combustion motor. The creditable performance of some of these cars during the last few years has done quite a little to allay the original feeling that the internal combustion motor, as adapted to railway service, would always be an experiment. Some of the advantages of the internal combustion cars, as developed in the use of this type of car on the Union Pacific, are:

1. Light motor weight, permitting lighter truck and body construction.
2. Elimination of the energy-generating unit, such as boilers, tanks and battery.
3. Convenience and compactness in carrying fuel.
4. Elimination of smoke, cinders and sound of exhaust.
5. Instant readiness of car for service.
6. No power losses nor expenses when shut down.

The present considered standard motor car, put in service by the Union Pacific, is a 55-ft. all-steel car, equipped with 200-h.p. motor, and carrying 75 passengers, car weighing 60,000 lbs. A similar car 70 ft. long has been built, seating over 100 passengers and weighing 68,000 lbs. It will be seen that the dead-weight carried amounts to from 660 lbs. to 800 lbs. per passenger, which compares favorably with modern automobile practice. Fuel sufficient for a 300-mile run is stored in a single tank of convenient size, located in an out-of-the-way place, and is all fed automatically until the last drop is used. Dead cars have actually been placed in commission on five minutes' notice.

These advantages particularly fit this type of car for operation where fuel cost is excessive or where conveniences for handling and maintaining steam or electric cars do not exist.

The first gasoline motor car of the direct or mechanically driven type was turned out in March, 1905. This first car, numbered one, was an experimental car, 31 ft. long, weighing a trifle over 20 tons. This car was equipped with a 100-h.p. engine. The test of this car demonstrated the practicability of the Union Pacific design gasoline motor car.

Subsequent cars built by the Union Pacific and the McKeen Motor Car Company have been 55 ft. long, and this car has been considered the standard. Two additional cars were constructed in the year 1905; six cars were built in 1906; ten in 1907; and one car was constructed for the Union Pacific in 1908, making twenty cars that have been constructed for the Union Pacific. A number of these cars were disposed of to other lines.

At the beginning of the current year the building of motor cars was discontinued by the Union Pacific, an independent company having been organized to carry on this work.

At the present time the Union Pacific has fifteen motor cars in service, the following services being operated:

Run.	State.	Cars assigned.	Dist. in miles.	No. road trips daily.	Total mileage.
Kearney to Callaway	Nebraska.	2	65	2	260
Loup City to St. Paul.....	"	1	39	2	156
Beatrice to Lincoln	"	1	40	2	160
Omaha to Valley.....	"	1	34.8	2	139
Lawrence to Leavenworth..	Kansas.	1	34.3	1	68
Lawrence to Kansas City...	Kansas.	1	38.9	1	78
Sterling to Greeley	Colorado.	3	97.6	2	390
Boulder to Brighton	Colorado.	1	27.7	2	111
Omaha to Council Bluffs over Mo. River Bridge..	Nebraska.	1	2.8	24	134.4

This leaves three cars for protection of the various runs and for swing cars when any of the above assigned cars are shopped.

On the Kearney-Callaway, Loup City-St. Paul, Omaha-Valley, Lawrence-Leavenworth, Sterling-Greeley and Boulder-Brighton runs the motor cars haul a trailer, trailer being used for baggage and express and for mail where required.

Seven of the earlier cars placed in service on the Union Pacific were equipped with 100-h.p. engines. Five of these 100-h.p. cars are still in service. The regular or standard type of car in service is equipped with a 200-h.p. six-cylinder reversible gas engine, coupled with a Morse silent chain and a friction clutch to the front axle of the car, which carries 24,000 lbs., or approximately 40 per cent. of the entire weight of the vehicle, and gives ample adhesion under all circumstances.

*Abstract of a report presented at the annual convention of the American Railway Master Mechanics Association. Committee: C. E. Fuller (chairman), R. N. Durborow, A. W. Horsey, J. H. Manning.

Two speeds are used—a low, or geared, speed for starting, and a high, or direct, speed for running. Both speeds are available for running backward. The more recent cars differ from the earlier car only in slight details. The side entrance has been introduced instead of rear entrance, with the idea of doing away with the accumulation of ice and snow on car steps, also obviating the use of step box. Smoking compartments have been provided by means of extending a full partition across the car immediately in front of side entrance, thus isolating the smokers from the rest of the passengers, and this seems to meet with the general approval of the traveling public. Owing to the fact that some of the services have outgrown the capacity of the 55-ft. cars, the Union Pacific is arranging to introduce a 70-ft. type of car.

These cars are operated on branch lines by a crew of two men, consisting of motorman in the engine room and a conductor to take tickets, handle orders, etc. All working units subject to wear, such as water-circulating pumps, clutch-friction parts, magneto and spark coils, are designed for separate and quick removal; and duplicates of such spark parts kept at terminals for replacements; and, in this manner, the cars can be kept in service almost indefinitely. All parts of motors and transmission being built to interchangeable jigs and templates, the problem of replacements and repairs has been very much simplified. Where the motor-car service is operated in conjunction with and as supplementary to steam-train service, a straight passenger car is the preferred style of car. Hand baggage can be taken in the car with passengers, and heavy baggage carried on the regular steam trains.

It is not economical to carry baggage on every train where the service is of much frequency. On branch lines where the motor car is substituted in place of a steam train, a combined baggage and passenger motor car is the preferred type. However, on branch lines where there are a number of round trips per day, it may be desirable to carry baggage on only part of the trips, and in such cases the motor car and trailer is the preferred type, on account of the fact that when it is not necessary to carry baggage, the trailer can be cut off and the passenger motor car make the trip alone, thus saving the extra expense of carrying the dead weight trailer.

The motor cars have no difficulty whatever in maintaining a passenger-train schedule, and in addition stopping for passengers, when flagged, at road crossings. This is a great accommodation to the railway's patrons, and is much appreciated by them. The operation of these cars shows a very heavy passenger traffic development, which, while partially due to the increased frequency of service, is, however, due to the accommodation in making these road-crossing stops. The farmers and those living along the right-of-way, by simply walking to the road crossing, eliminate the necessity of driving to the nearest railway station.

A circular of inquiry has been prepared, to be sent out next year. It asks the following questions:

1. Do you consider the independent motor car for railway service a feasible and desirable proposition, and why?
2. Is the field of usefulness for an individual motor car enlarging on steam roads?
3. Can the steam roads successfully compete with electric lines in interurban business, by means of the motor car?
4. Granting the desirability of motor cars, as an adjunct service on steam roads, state your opinions on the relative practicability of
   (a) Steam,
   (b) Electricity,
   (3) Gasoline.
5. With respect to the gasoline motor, state your opinion as to the desirability of the following general types:
   (a) Gasoline-electric with storage batteries.
   (b) Gasoline-electric without storage batteries,
   (c) Gasoline-direct mechanical drive.
6. Should the motor be located on the car body, or on the truck or trucks?
7. Do you favor a separate and removable truck power unit to facilitate repairs?
8. Should an independent motor car, carrying passengers, be used; or, a front motor car carrying baggage, mail and express, and pulling a passenger trailer?
9. Is not the problem of light weights imperative for economy with any type of motor car, considering the frequent accelerations and retardations incident upon numerous stops?
10. What will be the probable outcome of the general adoption of gasoline-propelled motor cars, relative to the available gasoline supply?
11. What will be the trend of the internal-combustion motor in the future, with reference to fuel substitutes for gasoline?
12. Does the use of producer gas for this system of propulsion offer mechanical and commercial possibilities for the future?
13. Have you in operation a self-contained motor car, combination or otherwise, for the carrying of passengers?

Blueprint of engine or such description to enable a clear understanding of the general construction, horse-power, transmission and weight of engine, including everything pertaining to the creating and delivering of power at driving wheel or wheels?

Detailed figures are also asked covering maximum grade, length, average daily mileage, round trips per day, maximum speed, average schedule speed, weight and dimensions of car, rates of pay of crew, cost and kind of fuel, and other supplies, repairs, etc.

REGISTRATION—MASTER MECHANICS.

Adams, A. C., M.M., N. Y., N. H. & H. R. R., Haddon Hall.
Akans, Geo., Southern R. R., Arlington.
Aldcorn, Thos., Chicago Pneumatic Tool Co., Marlboro-Blenheim.
Allan, Arthur, M. M., T. & N. O. Ry., Young's.
Allen, C. W., Shelbourne.
Allen, G. S., M. M., Philadelphia & Reading R. R., Pinehurst.
Allison, W. L., M. E., A., T. & S. F. Ry., Marlboro-Blenheim.
Arp, W. C., S. M. P., Vandalia, Marlboro-Blenheim.
Arthur, C. G., M.M., Southern R. R., Wentworth.
Atkinson, Roger, Fredonia.
Ayers, A. R., Asst. M.M., L. S. & M. S. Ry., Marlboro.
Bagley, J. J., M. M., Stickney.
Baltz, Valentine, Chief Joint Car Inspector, Wheeling Ter., Norwood.
Bawden, Wm., M. M., Terminal Railroad Association, Lockhart
Bennett, W. J., A.S.M.P., Chicago, Indianapolis & Louisville, Haddon Hall.
Bennett, W. H., M. M., P. R. R., Dunlap.
Billingham, R. A., S. M. P., Pitts., Shaw. & N., Traymore.
Black, W. G., M.M., N. Y. C. & St. L. R. R., Waldorf.
Barton, T. F., M. M., D., L. & W. R. R., Haddon Hall.
Basford, G. M., American Locomotive Co., Marlboro-Blenheim.
Beamer, James A., M.M., Pennsylvania R. R., Chalfonte.
Blunt, J. G., American Locomotive Co., Traymore.
Boldridge, R. M., M.M., Central of Georgia, Chalfonte.
Bowles, C. K., M. M., Tidewater & Western, Monticello.
Boyden, N. N., M.M., Southern Ry., Arlington.
Bridges, E. A., M.M., Durham & Southern Ry. Co., 155 Tennessee ave.
Brown, David, A.S.M.P., Delaware, Lackawanna & Western, Strand.
Brown, H. B., M.M., Erie R. R., Boston.
Brown, W. A., M. M., Kanawha & Michigan, Penhurst.
Buchanan, A., Jr., Public Service Commission, Haddon Hall.
Burton, T. L., Philadelphia & Reading, Traymore.
Bush, S. P., G. M., Buckeye Steel Castings Co., Brighton.
Bussing, G. H., S.M.P. and R.S., Evansville & Terre Haute R. R., Hawthorne.
Brazier, F. W., M. M., N. Y. C. & H. R. R.R., Marlboro-Blenheim.
Canfield, J. B., M. M., Boston & Albany, Pennhurst.
Carroll, J. T., M. M., L. E. & W., Marlboro-Blenheim.
Casey, Marlboro-Blenheim.
Chamberlin, E., Marlboro-Blenheim.
Chambers, John S., S. M. P., Atlantic Coast Line, Marlboro-Blenheim.
Cheronworth, M. E., Young's.
Chester, W. E., Atlanta, Chalfonte.
Chidley, Jos., M. M., Lake Shore & Michigan Southern Railroad, Marlboro-Blenheim.
Chisholm, J. E., Haddon Hall.
Christopher, J., M. M., Toronto, Hamilton & Buffalo R.R., Young's Hotel.
Clark, F. H., G. S. M. P., Chicago, Burlington & Quincy, Marlboro-Blenheim.
Cleaver, F. C., S. M. P., Rutland, Marlboro.
Collier, L. L., M. M., L. & N. R. R., Dunlap.
Connolly, J. J., S. M. P., Duluth, So. Shore & Atlantic Railroad, Young's.
Cooper, F. R., S. M. P., Kansas City Southern Railway, Dennis.
Cory, Chas. H., Dennis.
Coutant, M. R., M. M., Ulster & Delaware, Chalfonte.
Cullinan, John, M. M., Central Indiana Railroad, Chetwood.
Cunningham, D. W., A. S. M., Missouri Pacific Railway, Penhurst.
Curtis, Theo. H., S. M., Louisville & Nashville Railroad, Marlboro-Blenheim.
Crawford, D. E., G. S. M. P., Pennsylvania Lines, Brighton.
Cross, C. W., S. A., New York Central Lines, Chalfonte.
Davis, M. J., A. M., Pennsylvania Railroad, Shelburne.
Davisson, F. E., S. M., San Pedro, Los Angeles & Salt Lake, Chalfonte.
Depue, G. T., M. M., Erie, Arlington.
DeVoy, J. F., M. E., Chicago, Milwaukee & St. Paul Railroad, Shelburne.

Desmond, D. G., M. M., Morgantown & Kingwood, Chester Inn.
Dickerson, S. K., A. S. M. P., Lake Shore & Michigan Southern Railroad, Marlboro-Blenheim.
Diehr, C. P., M. M., New York Central & Hudson River Railroad, Jersey Shore, Pa., Rudolph.
Dodds, E. I., A. S. C. E., Erie.
Dooley, M. M., Cincinnati, New Orleans & Texas Pacific, Dallas.
Dunham, W. E., M. M., Chicago & North-Western, Haddon Hall.
Dunn, J. F., S. M. P., Oregon Short Line, Marlboro-Blenheim.
Drury, Michael J., M. M., Atchison, Topeka & Santa Fe Railroad, Haddon Hall.
Edwards, J. B., M. M., Columbia, Newberry & Laurens, Ponce de Leon.
Ettinger, R. L., C. M. E., Southern Railway, Dennis.
New, W. E., M. M., Kansas City Belt Railway Co., Morris.
English, Richard, San Francisco, Cal., Penherst.
Enright, J. F., S. M. P., International & Great Northern Railroad, Dennis.
Fairbank, J. F., M. M., Malvern & Freer Valley.
Ferguson, L. B., M. M., Vicksburg, Shreveport & Pacific Railroad, Monticello.
Flynn, Walter H., M. M., Michigan Central, St. Thomas, Marl.-Blen.
Fowler, Geo. L., Dennis.
Ferguson, G. A., Boston & Albany Railroad, Young's.
Fetner, W. H., M. M., Central of Georgia Railway, Chalfonte.
Fitzmorris, Jas., M. M., Chicago Junction Railroad, Young's.
Flavin, J. T., M. M., Chicago, Indiana & Southern Railroad, Barl.-Blen.
Flory, B. P., M. E., Central of New Jersey Railroad, Marl.-Blen.
Forsyth, Wm., M. E., *The Railroad Age Gazette*, Dennis.
Fogg, J. W., M. M., Chicago Terminal Transfer, Chalfonte.
Foster, O. M., M. M., L. S. & M. S. Railway, Shelburne.
Franey, M. D., S. S., Lake Shore & Michigan Southern Railway, Marl-Blen.
Fuller, C. E., S. M. P., Union Pacific Railway, Marl.-Blen.
Fulmer, J. H., M. M., Pennsylvania Railroad, Iroquois.
Gaines, F. F., S. M. P., Central of Georgia, Dennis.
Gardner, Henry, N. Y. C., Chalfonte.
Garstang, Wm., S. M. P., C. C. C. & St. L., Marl.-Blen.
Gauthier, Jesse, M. M., Copper Range, Majestic.
Gentry, T. W., American Locomotive Co., Wiltshire.
Glass, John C., M. M., Pennsylvania R. R.
Gordon, H. D., 71 John St., Marl.-Blen.
Gorey, E. H., G. F., L. & N. R. R.
Gossett, C. E., M. M., Iowa Central, Traymore.
Graham, Charles, Am. Loco. Co., Traymore.
Green, H., 500 Fifth Ave., Dennis.
Grimshaw, F. G., M. M., Pennsylvania.
Gross., E. G., M. M., Central of Georgia, Islesworth.
Hamilton, W. H., M. M., Atchison, Topeka & Santa Fe, Iroquois.
Haggett, E. C., Supt., Am. Loco. Co., Traymore.
Haig, M. H., M. P. A., A., T. & S. F., Haddon Hall.
Hair, John, S. M. P., Baltimore & Ohio, S.-W., Dennis.
Hainen, J., S. M. P., Southern, Windsor.
Hale, H. H., M. M., G. & S. I., Shelburne.
Harrington, H. H., M. M., Erie.
Harris, C. M., M. M., Washington Terminal, Shelburne.
Harrison, F. J., M. M., Buffalo, Rochester & Pittsburg, Pomsettia.
Haug, H., M. M., Brownstone & Middletown, Pennhurst.
Hayes, J. F., M. M., Grand Rapids & Indiana, Islesworth.
Hardie, Henry, M. M., L. & N., Marl.-Blen.
Hayward, H. S., S. M. P., Pennsylvania, Chalfonte.
Heintzleman, T. W., S. M. P., Southern Pacific, Chalfonte.
Henderson, G. R., 20 W. 34th St., Galen Hall.
Henry W. C. A., S. M. P., Penn. Lines West, Shelburne.
Hill, W. H., M. M., Cornwall R. R., Pennhurst.
Hinckley, A. C., M. M., Cincinnati, Hamilton & Dayton, Traymore.
Hogan, C. H., D. S. M. P., N. Y. C. & H., Marl.-Blen.
Hobson, W. P., A. M. M., Chesapeake & Ohio, Haddon Hall.
Hodgins, George, 136 Liberty St., Haddon Hall.
Hoffmann, C. M., M. M., Southern, Stickney.
Howson, G. N., M. M., Southern, Westminster.
Hyndman, F. T., 1472 Chapel St., Brighton.
Jacobs, H. W., A. S. M. P., A., T. & S. F., Haddon Hall.
Jaynes, R. T., M. M., Lehigh & Hudson River, Traymore.
Johan, Jacob, 5323 Delancy street, Philadelphia.
Johnson, L. R., S. M. P., Canadian Pacific, Haddon Hall.
Jones, Harry, C., R. I. & P.
Justice, D. J., Shelburne.
James, Charles, M. M., Erie, Monticello.
Johnson, R. H., Ortega, Mex., D. F., Westminster.
Kneass, Strickland L., Wm. Sellers Co., Ltd., Marl.-Blenheim.
Kapp, W. F., S. S. & M., Rich., Fred. & Potomac, Blenheim.
Kaderly, W. F., M. M., Southern, Arlington.
Kellogg, W. L., M. M., Pere Marquette, Traymore.
Kilpatrick, J. B., A. S. M. P., Chicago, R. I. & Pacific, Traymore.
Kilpatrick, R. F., A. S. M. P., D. & R. G., Traymore.
Kinney, M. A., M. M., Hocking Valley, Young.
Kinney, W. H., M. M., N. Y., Ontario & Western, Traymore.
Keenan, C. E., M. M., N. Y. C. Lines, New England.
Kendig, R. B., M. E., Lake Shore & Mich. Southern, Marlboro-
Kurman, A. G., M. M., Mt. Jewett, Kinzua & Riterville, Arlington.
Blenheim.
Kyle, C., M. M., C. P. R., Haddon Hall.
Lane, F. W., Dennis.
Lape, C. F., Haddon Hall.
Leach, H. L., Marlboro-Blenheim.
Leach, W. B., Marlboro-Blenheim.
Luscombe, J. T., M. M., T. & O. C. Ry., Youngs.
Lewis, W. H., S. M. P., Norfolk & Western, Marlboro-Blenheim.
Leyonmarck, John H., M. E., C. & A., Chalfonte.
Likert, G .H., Supt., N. P., Shelburne.
Lowell, Geo. H., Asst. M. M., L. & N.
Lovell, Alfred, Traymore.
Lyon, Tracy, Westinghouse Electric & Mfg. Co., Dennis.
Mathis, J. E., M. M., Ga. & Fla., 26 Penn. Ave., City.
Manchester, H. C., A. S. M. P., Maine Central, Brighton.
Maxfield, H. H., M. M., P. R. R.
Miller, S. W., American Locomotive Co., Traymore.
Moll, George, M. M., Philadelphia & Reading.
Moriarty, G. A., M. M., N. Y., N. H. & H., Rudolph.
Mullinix, S. W., S. M. P., C. R. I. & P., Windsor.
Mackenzie, John, Young's.
Maher, P., S. M. P., Chicago & Alton, Toledo & St. Louis & Western, Marlboro-Blenheim.
Manchester, A. E., S. M. P., Chicago, Milwaukee & St. Paul, Traymore.
Marea, M., M. M., T. St. L. & W., Windsor.
Margarvey, J. R., American Locomotive Co., Traymore.
Meuree, M. S., M. M., Elgin, Joliet & Eastern, Berkshire.
McCarthy, M. J., S. S., C. C. C. & St. L., Marlboro-Blenheim.
McCuen, J. P., S. M. P., C. N. O. & T. P. and A. G. S., Dennis.
McFetters, F. R., Supt., Union, St. Charles.
Michael, J. B., M. M., Southern, Westminster.
Miller, W. J., M. M., St. L. Southwestern of Texas, Strand.
Monahan, J. J., M. M., Louisville & Nashville, Iroquois.
Murrian, W. S., S. M. P., Southern, Windsor.
McBain, D. R., A. S., M. P., N. Y. C. & H., Marlboro-Blenheim.
McBeth, H. A., M. M., N. Y., Chicago & St. Louis, Haddon Hall.
McGrath, J. T., M. M., Grand Trunk, Young's.
McIntosh, Wm., S. M. P., Central R. R. of N. J., Marlboro-Blenheim.
McKee, G. S., S. M. P., Mobile & Ohio, Shelburne
McMann, J. B., Supt. Bangor & Aroostook, Dennis.
McNaughton, Jas., American Locomotive Co., Marlboro-Blenheim.
McNulty, F. M., M. M., Monongahela Connecting, Chalfonte.
McRae, J. A., M. E., Michigan Central, Chalfonte.
Marshall, J. R., Supt. American Locomotive Co., Traymore.
May, H. C., M. M., L. & N., Chalfonte.
May, Walter, M. M., Cleve., Cin., Chicago & St. Louis, Chalfonte.
Meister, C. L., M. E., Atlantic Coast Line, Shelburne.
Mellin, C. J., American Locomotive Co., Traymore.
Miller, E. A., S. M. P., N. Y. C. & St. L., Haddon Hall.
Minshull, P. H., M. M., N. Y., O. & W., Traymore.
Moir, William, M. S., Northern Pacific, St. Paul, Minn., Chalfonte.
Meredith H. P., Asst. Engineer M. P., P. R. R., Chalfonte.
Montgomery, Donald, Bangor & Aroostook, Dennis.
Montgomery, Hugh, S. M. P., Bangor & Aroostook, Dennis.
Murphy, J. H., M. M., Cin., New Orleans & Tex. Pac., Dennis.
Nash, N. H., M. M., Ill. Central, Haddon Hall.
Nicholson, Jno., S. M. P. & M., St. L., B. & M. R., Marlboro-Blenheim.
Nelson, E. D., E. of T., Pennsylvania R., Sea Side.
New, W. E., M. M., K. C. Belt R., Morris.
Newhouse, J. F., M. M., Kan. & Ind. Bridge & R., Young's.
Newton, C. H. H., M. G. B., Ga. R., Marlboro-Blenheim.
Norris, W. B., Gen. Fore., Altoona shops, Dennis.
Noxon, Frank W., sec'y Ry. Business Asso., Chalfonte.
O'Hearne, J. E., M. M., Wheeling & Lake Erie, Marlboro-Blenheim.
O'Herin, Wm., S. M., Mo., Kan. & Tex.
Owens, W. H., M. M., Southern R., Stickney.
Passmore, H. E., M. M., Toledo & Ohio Cent., Young's.
Pearce, J. S., M. M., Norfolk & Western, Haddon Hall.
Peck, Peter H., Marlboro-Blenheim.
Phillips, C., M. M., New Orleans & Northeastern, Brighton.
Phipps, M. M., Canadian Pacific, Haddon Hall.
Platt, J. G., Dennis.
Pomeroy, L. R., mechanical engineer, associate member, Dennis.
Parish, Le Grand, S. M. P., Lake Shore & Michigan Southern, Marlboro-Blenheim.

Patterson, J. S., Galena Signal Oil Co., Marlboro-Blenheim.
Patterson, Robt., master mechanic, Grand Trunk, Young's.
Petrie, L. A., M. M., Oaho Ry. & Land Co., Dunlop.
Pilcher, J. A., M. E., Norfolk & Western, Windsor.
Place, F. E., Buda Foundry & Machine Co., St. Charles.
Poole, A. J., G. M. M., Seaboard Air Line, Marlboro-Blenheim.
Preston, Robert, M. M., Canadian Pacific, Haddon Hall.
Quackenbush, A. W., M. M., Omaha & Kans. C., Chalfonte.
Quayle, Robert, S. M. P. & M., Chi. & N. W., Marlboro-Blenheim.
Quigley, Jos., M. M., C. N. O. & T. P., Dennis.
Rae, C. H., Gen. M. M., L. & N., Marlboro-Blenheim.
Redding, D. J., M. M., Pittsburg & Lake Erie, Marl.-Blenheim.
Roberts, E. M., C. & O., Southern.
Reid, H. G., M. M., Canadian Pacific, Haddon Hall.
Reid, W. L., American Locomotive Co., Traymore.
Reynolds, O. H., Bethlehem Steel Co., Dennis.
Riley, George N., M. M., McKeesport Connecting, Marl.-Blen.
Rogers, R. H.
Robinson, Frank, Robinson Co., Chalfonte.
Rosing, W. H. V., M. E., Missouri Pacific.
Royal, C. B., Haddon Hall.
Russell, W. B., Franklin Union, Iroquois.
Rink, G. W., M. E., C. R. R. of N. J., Chalfonte.
Rydberg, C. F., Supt. Shops, Canadian Pacific, Windsor.
Sasser, E. C., M. M., Southern, Arlington.
Schlafge, Wm., M. S., Erie, Young's.
Scheffer, F. H., S. M. P., Nash., Chat. & St. Louis, Runnymede.
Seabrook, C. H., S. M. P. E., T. & R. Y., Chalfonte.
Sechrist, T. O., M. M., Cin., N. O. & Texas Pacific, Elberon.
Sedgwick, E. V., Galena Signal Oil Co., Young's Hotel.
Seidell, G. W., Supt. Shops, Chi., Rock Island & Pac., Traymore.
Seddon, C. W., S. M. P., Duluth, Missabe & Northern, Chalfonte.
Seley, C. A., Mech. Engr., C., R. I. & P., Chalfonte.
Setchel, J. H., Dennis.
Shoemaker, H., M. M., Del., Lack & Western, Traymore.
Sheahan, J. F., M. M., Southern, Arlington.
Sinclair, Angus, Haddon Hall.
Slater, Frank, M. M., Chi. & North-Western, Berkshire Inn.
Smith, C. B., M. E., Boston & Maine, Dennis.
Smith, John L., G. F., Pitts., Shawmut & Northern, Poinsettia.
Smith, W. T., M. M., Chesapeake & Ohio, Dennis.
Smith, W. A., Dennis.
Smith, R. D., A. S. M., B. & A., Dennis.
Smock, F. A., M. M., P. R.
Steel, Frank, M. M., N. Y. C. & H. R., Monticello.
Stewart, C. J., M. M., Central New England, Dennis.
Stewart, A. F., M. M., Chesapeake & Ohio, Traymore.
Stewart, A., M. S., Southern, Windsor.
Stocks, W. H., Chalfonte.
Stuart, C. M., M. M., P. & R., 166 Pennsylvania avenue.
Stulb, W. H., M. M., Cent. of Ga., Traymore.
Street, Clement F., W. A. B. Co., Marlboro-Blenheim.
Sweetman, E. M., M. M., So. R., Clarendon.
Taylor, C. M., S. M. P., Chicago, Rock Island & Pacific, Pennhurst.
Taylor, C. W., S. M. P., San Antonio & Aransas Pass, Shelburne.
Taylor, Jos. W., Secretary, Amer. Ry. M. M. Ass'n., Marlboro-Blenheim.
Taylor, Wm. H., M. M., N. Y., Susq. & Western, Bothwell.
Taylor, Grant W., G. S. T., Windsor.
Terrill, C. H., M. M., Chesapeake & Ohio, Haddon Hall.
Thomas, H. T., M. M., Detroit & Mackinac.
Tuma, Frank, M. M., Erie.
Thompson, E. B., S. M. P., C., St. P., M. & O., Chalfonte.
Thomas, J. J., Jr., M. M., Atlantic Coast Line, Chalfonte.
Thomas, W. H., 4230 Spruce St., Dennis.
Tollerton, W. J., A. G. S. M. P., C., R. I. & P. Marlboro-Blenheim.
Tonge, John, M. M., Minneapolis & St. Louis, Dennis.
Tracy, W. L., A. S. Machinery, Missouri Pacific, Chalfonte.
Trumbull, A. G., M. S., Erie, Young's.
Turner, Calvin G., M. M., Phila, Balt. & Wash., Pennhurst.
Turner, J. S., Pressed Steel Car Co., M. B.
Vaughan, H. H., Asst. to V. P., Canadian Pacific, M. B.
Vought, Harry D., Secretary, New York & Central Railway Clubs, Windsor.
Van Buskirk, H. C., S. M. P., Colorado & Southern, Dennis.
Van Doren, G. L., S. S., Central of N. J., Worthington.
Wagstaff, George, Amer. Loco. Equipment Co., Marlboro-Blenheim.
Wahlen, John, M. M., Montpelier & Wells River, Rudolph.
Walsh, F. O., M. M., A. & W. P. & W. of Ala., Marlboro-Blenheim.
Walsh, J. F., S. M. P., Chesapeake & Ohio, Marlboro-Blenheim.
Warnock, H. R., G. F. L. D., Monongahela, Lexington.
Waters, J. J., S. M., Mex. Cent., Marlboro-Blenheim.
Warthen, J. O., M. M., D. & W., Arlington.
Watson, R. R., Engr. Tests, Erie, Poinsettia.
Weisgerber, E. L., M. M., Baltimore & Ohio, Grand Atlantic.
Wells, Reuben, Paterson, Chelsea.
Wilson, W. H., S. M. P., B., R. & P., Brighton.
Watson, R. B., Supt. of Tests, Lexington, Poinsettia.
Watson, Samuel, M. M., N. Y. C. & H. R., Rudolph.
Watters, J. H., A. M. M., Georgia.
Watts, Amos H., M. M., Cincinnati Northern, Dennis.
Wildin, G. W., M. S., N. Y., N. H & H., Chalfonte.
Williams, W. H., M. M., B., R. & P., Poinsettia.
Wilson, Charles, M. M., Lehigh Valley, Elberon.
Wright, R. V., American Engineer, Brighton.
Young, C. D., A. E. M. P., Penna. Lines West, Shellburne.

REGISTRATION OF M. M. GUESTS.

Ackerman, A. C., M. M., Atlantic City & Shore Railroad.
Ackerman, John N., Gen. Supt., Atlantic City & Shore Railroad.
Anderson, Geo. T., Supt., C. Y. B. Refrigerator, Chalfonte.
Atkinson, C. R., Stenog., G. S. M. P., P. R. R., Lamborn.
Atkinson, E. M., Agent, West Jersey & Seashore.
Atkinson, Harold C., Fredonia.
Atkinson, Reginald A., Fredonia.
Atkinson, W. V., West Jersey & Seashore.
Beales, E. E., Locomotive Engineer, N. Y. Central, Beaumont.
Blewett, Scott H., American Car & Foundry Co., Marl.-Blen.
Bucher, Fred, American Locomotive Co., Hartford.
Burnett, R. W., A. M. C. B., Canadian Pacific Railway, Marlboro Hotel.
Carey, J. L., Signal Maintenance, A. C. R. R., Devonshire.
Carey, W. S., Pennsylvania Railroad.
Chamberlain, J. T., Young's.
Chambers, C. F., M. M., Central Railroad of New Jersey.
Chenoweth, E. G., M. E., Erie, Young's.
Crossman, T. E., Official Stenog. for M. M., Dennis.
Davis, Jos.. M. M., Pennsylvania.
De Baun, Frank, Windsor.
Dilkes, Chas. E., Jr., Tax Agent Real Estate Departmet, Pennsylvania Railroad Co., Chalfonte.
Dow, Geo. N., Gen. Mech. Ins., N. Y. Central Lines, Chalfonte.
Durham George S., C. & N. W., Haddon Hall.
Ebert, J. W., P. R. R., Jackson.
Eddy, W. J., Gen. Tool Inspector, Erie, Young's.
Edmondson, T. A., G. M., Illinois Car Co., Young's.
Fetner, Westcott, Central of Georgia, Chalfonte.
Finnigan, L., G. F., B. & A., St. Charles.
Foster, Frank, Lehigh Valley, Elberon.
Fraser, B. P., Pass. Agt., Pennsylvaia R.R., Chalfonte.
Gilmore, G. H., M. C. B., N. P. R. R., Chalfonte.
Guthrie, G. W., Chalfonte.
Haig, J. F., Pur. Dept., P. R. R.
Hastings, Clive, A., T. & S. F., Haddon Hall.
Hastings, Frank, Pennsylvania R. R., Jackson.
Haukins, F. W., Mch. Shop. Foreman, Cumberland Valley, Monticello.
Hemmelberger, C. M. Trainmaster, Philadelphia & Reading.
Hemphill, H. W., Chalfonte.
Hines, B. F., G. F. C. D., N. O. & N. E. Railroad, Brighton.
Hinkley, Thos. P., Traymore.
Hough, Harry, M. M., Brownstone, Middletown Railway Co., Penhurst.
Isherwood, J. A., Chief Clerk, C. Railroad.
Jones, W. F., General Storekeeper, N. Y. Cen. Lines, Chalfonte.
Johns, M. E., Supt., N. Y., Susquehanna & Western, Bothwell.
Johnson, Bradley.
Johnson, J. T., Gen. Supt., Central of Louisiana, Dennis.
Kauffman, G. B., Pass. Agt., Atlantic City Railroad, Boardwalk and North Carolina avenue.
Kelleher, W. J., Pass. Agt., N. O. & N. E. R.R., Rudolph.
Keown, Jr., Robt., City Ticket Agt., Pennsylvania R.R., Brevoort.
La Bonta, W. F., P., A., C. & O. Railway, Blenheim.
Lawler, National Association Railway Commissioners,.
Loughery, M. C., Engineer, P. & R., Deleware.
Little, B. A., M. P., P. R. R., Dunlop.
MacMuller, Harry, E. A. and G. Insp., P. & R.
McCallister, W., M. M. (retired), Pennsylvania Co.
McCool, Chas., Pass. Dept., Pensylvania R.R., Shelburne.
McCormick, W. H., Asst. Gen. Pass. Agt., P. & R. R., Chalfonte.
McManus, C. S., Pres. K. S. & E. R., Windsor.
McMaster, H. W., Gen. Mgr., Wabash Terminal, Traymore.
Marsh, F. E., Asst. M. M., Pennsylvaia R.R.
Meaney, P. J., Trunk Line Association, Mector Inn.
Merryman, M., Ch. Cl., S. M. P., Western Maryland, Pennhurst.
Moody, Samuel, Gen. Pass. Agt., Galen Hall.
Moffit, W. H., M. C. B., C. & Ga., Chalfonte.
Murphy, James S., city ticket agent, Penn. R.
Pabst, R. A., Dunlop.

Ramsdell, T. M., M. C. B., Ches. & Ohio R., Chalfonte.
Rapp, F. C., M. M., A., C. & S. R.
Reed, E. C., Marlboro-Blenheim.
Rogers, J. W., Pennsylvania R. R.
Rowland, R. R., chief draftsman, Western Maryland, The Jefferson.
Ryder, E., Gen. Supt., C., I. & S. R., Dennis.
Sage, Ralph V., chief engr., steel car dept., Cambria Steel Co., Brighton.
Savage, J. W., Ch. Cl., S. M. P., C., N. C. & T. R. R., Elberon.
Savage, J. W., Cl., S. M. P., C., N. O. & T. P. R.
Schmidt, Prof. E. C., Univ. of Ill., Haddon Hall.
Sharp, W. E., Supt. American Car Lines, Marlboro-Blenheim.
Smart, Geo. E., Gen. Car Ins., Canadian Pacific R., Young's.
Spicer, M. T., C. C. to Mr. Stephens, C. & O., Chalfonte.
Telford, A. C., N. O. & T. P., Ala. Gt. Sou., Marlboro-Blenheim.
Turner, G. S., Gen. Equip. M., So. R., Clarendon.
Ullick, L. C., Asst. to Gen. Mgr., So. P. R., Marlboro-Blenheim.
Walsh, G. B., Gen. For., N. Y. Central, Beaumont.
Watts, Chas., Gen. Supt., P. Trans., Penn. Lines.
Westlake, E. W., Supt. Dining Cars, Penn. Lines.
Williams, C. B., Gen. S. K., Cent. R. of N. J.
Yates, L. L., Supt. Car Shop, Pacific Fruit Express, Haddon Hall.

TO-DAY'S PROGRAM.

ENTERTAINMENTS.

10.30 a.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Orchestra concert, Entrance Hall, New Pier.

3.30 p.m.—Band concert, Hippodrome, New Pier.

4 p.m.—Recital, Mary Jordan FitzGibbon, contralto, ball room, Marlboro-Blenheim Hotel.

9.30 p.m.—Forty-second annual ball of the American Railway Master Mechanics' Association, Entrance Hall, New Pier.

MIDDLE SESSION, M. M. ASSO., 9.30 A.M. TO 1.30 P.M.

Discussion of reports on:

"Castle Nuts"	9.30 a.m. to 10.00 a.m.
"Safety Valves"	10.00 a.m. to 10.15 a.m.
"Superheaters"	10.15 a.m. to 10.30 a.m.
Discussion of individual paper on "Locomotive Performance under Saturated and Superheated Steam." By Prof. W. F. M. Goss	10.30 a.m. to 12.00 m.

Topical discussions:

(1).—"Vanadium Steel. Have the advantages claimed and shown in laboratory tests been substantiated in practice, particularly as regards the strengthening of locomotive parts?" To be opened by W. C. A. Henry	12.00 m. to 12.30 p.m.
(2).—"Are by-pass valves necessary on piston-valve locomotives?" To be opened by H. T. Bentley, Chicago & North Western	12.30 p.m. to 1.00 p.m.

On account of lack of time on yesterday, the two following topical discussions will be handled to-day if possible:

(3).—"Is the additional cost of flexible staybolts justifiable?" To be opened by H. D. Brown, Erie	12.00 m. to 12.30 p.m.
(4).—"Is the usual front row of crown bolts in a locomotive boiler beneficial or otherwise?" To be opened by C. A. Seley, Rock Island Lines	12.30 p.m. to 1.00 p.m.

Discussion of reports on:

"Widening Gages on Curves"	1.00 p.m. to 1.15 p.m.
"Steel Tires"	1.15 p.m. to 1.30 p.m.

Dr. J. M. Griffin, President of the Wheel Truing Brake Shoe Company, Detroit, has an interesting exhibit in space 428. The arrival of the exhibit just in time to install Wednesday morning greatly relieved the anxiety of Dr. Griffin. The sample shoes are new and a new catalogue is being distributed.

Walter P. Hudson is attending these conventions for the first time since his appointment as manager of the railway department of the Russell & Erwin Manufacturing Company. Mr. Hudson has no exhibit, but he's promising his railway friends that he'll be on hand next year with a good display of door checks, wrenches, locks and the other hardware specialties, on which the company has built such a splendid reputation. Mr. Hudson is staying at the Traymore Hotel.

* * *

FOUND.—Small trunk key, with white tape attached. Owner may recover by asking for same at office of the DAILY RAILROAD AGE GAZETTE.

A 250-h.p. steam motor car, built by the Baldwin Locomotive Works for the Railway Auto Car Co., New York, is open for inspection to the visiting railway men. The car is at Atlantic City on the Pennsylvania Railroad tracks. The car made a trip from Philadelphia to Atlantic City under its own power. The new 250-h.p. equipment for this car has just been completed, and is designed to make a maximum speed of 50 h.p.h. The drawbar pull is about 6,000 lbs. The car weighs about 50 tons in working order and carries fuel and water for about 60 miles.

The Asbestos Protected Metal Co., Canton, Mass., in space 353, has a new product to show its railway friends this year in the form of an asbestos covered metal sheet in colors. White, terra-cotta and gray are the colors in which Asbestos Protected Metal is now produced in its various forms and a combination of these colors is possible, which renders the exterior surface of the building mutual in tint, while maintaining a bright interior for the reflection of light and general improvement of the working conditions.

The Swiss State railways report that at the beginning of this year 90 per cent. of the operating employees could speak two or more languages.

LIST OF EXHIBITS.

The following represent the additions and corrections to the list printed in yesterday's Daily:

Brown & Sharpe Manufacturing Company, Providence, R. I.—Vertical spindle milling machines, plain milling machines and attachments for milling machines. Represented by R. T. Eaton, R. W. McLaren and W. H. Sherman.

Bullard Car Door Equipment Company, Birmingham, Ala.—Car door hangers. Represented by R. G. Bullard and D. S. Walreven.

Chicago Pneumatic Tool Company, Chicago, Ill.—Compressor in the power-house on Young's Pier. Represented by W. O. Duntley, Thos. Aldcorn, G. A. Barden, J. C. Campbell, John Sanborn, W. F. Heacock, Harry and Griner.

Chisholm & Moore Manufacturing Company, Cleveland, Ohio.—One thirty-ton chain hoist, largest ever made, and various sizes of chain hoists and trolleys. Represented by H. E. Dickerman and E. Y. Moore.

Cooper-Hewitt Electric Company, New York, N. Y.—Cooper-Hewitt lamps for shop and train-shed lighting. Represented by Chas. B. Hill, H. B. Buckman, and J. B. O'Shea.

Coale Muffler & Safety Valve Company, Baltimore, Md.—With the exhibit of the Nathan Manufacturing Company. Locomotive muffled safety valve. Represented by H. C. McCarty.

Dake-American Steam Turbine Company, Grand Rapids, Mich.—One Dake turbine electric headlight generating set. Represented by E. B. Clouse and C. F. Gregory.

Davis Expansion Boring Tool Company, St. Louis, Mo.—Expansion boring tools for metal working. Represented by E. E. Davis and J. W. McKeen.

Diamond Rubber Company, Akron, Ohio.—Mechanical rubber goods; hose; belting; packing; molded goods; mats and

matting; insulated wire; pneumatic and solid tires; crude rubber. Represented by I. R. Bailey, W. E. Hardy, T. J. Smith, Geo. D. Pilgrim and M. F. Wood.

Electric Storage Battery Company, Philadelphia, Pa.—A complete line of storage batteries for car lighting, signal vehicle and ignition service. New "Car Lighting Battery Instruction Book," just published; also literature for all classes of storage battery service. Represented by Chas. Blizard, E. L. Reynolds, F. L. Kellogg and H. E. Hunt.

Mogul Paint Company, New York, N. Y.—Mogul non-slip track bolt compound. Represented by A. Grothwell and T. A. Forster.

National Railway Devices Company, Chicago, Ill.—Shroyer uncoupling apparatus; Dohlin automatic car door fastener; Nichols car door fastener; Schoemaker fire-box door operator; Turnbull driving wheel flange lubricator and Rubbertex roofing. Represented by J. W. Luttrell, Frank Schoemaker, Jay G. Robinson and Percy P. Hinckley.

National Tube Company, Pittsburg, Pa.—Seamless steel locomotive tubes, Spellerized locomotive tubes, seamless steel locomotive bells, seamless tubes for mechanical purposes, Kewanee unions, valves and air pump unions. Represented by Geo. N. Riley, L. R. Phillips, James C. Batesman, C. R. Cummings, H. C. Brown, L. F. Hamilton, W. S. Bitting, H. O. Ramsey and A. J. Hamilton.

Railway & Engineering Review, Chicago, Ill.—Represented by Willard A. Smith, A. E. Hooven, G. E. Ryder and P. G. Stevens.

Rapp, John W., New York, N. Y.—Steel doors. Represented by C. A. Leonardi.

Ryerson & Son, Joseph T., Chicago, Ill.—The corrected list of devices shown is as follows: Lennox rotary bevel shear; Ryerson high-speed friction saw; Ryerson portable automatic key-seating machine; Ryerson crank-pin truing machine; Ryerson flue welding machine; Hartz flue welding machine; model of the Ryerson flue cleaning machine; Ryerson cylinder boring bar; Ryerson internal combustion riveter; Ryerson high-speed chain hoist and trolleys; Ryerson valve seat facing machine; glyco-lined M. C. B. standard car journal bearings. The company's representatives at the convention are: G. H. Pearsall, E. T. Hendee, Fred Gardner, J. Kunzer, M. C. White and O. C. Duryea.

Spencer Turbine Cleaner Company, Hartford, Conn.—Showing method and machinery for cleaning by suction carpets, car seats and slatted floors of trolley cars. Represented by E. W. Muzzy, S. W. Bowerman, Roy B. Smith and G. H. Noble.

Tindel-Morris Company, Eddystone, Pa.—High duty inserted tooth cold saw blades; sawing machines; crank shaft lathes and grinding machines. Represented by Eugene C. Batchelar.

Trenton Malleable Iron Co., The, Trenton, N. J.—Trenton flush car door; Trenton refrigerator car door; Trenton hopper door; Malleable iron castings and emergency flue nipple. Represented by Sinclair J. Johnson, R. C. Fraser, R. C. Oliphant and A. R. Gould.

Urquhart, Henry H., Paducah, Ky.—An improved brake shoe for locomotives. Represented by Henry H. Urquhart and Chas. L. Puffer.

Westinghouse Electric Manufacturing Company, Pittsburgh, Pa.—Turbine train lighting set; stationary electric motors; arc lamps; incandescent, including carbon filament, metalized filament and Tungsten lamps; blowers, ventilating fans; current measuring instruments. Represented by A. C. McQuiston, J. H. Klinck, R. F. Moon, Chas. Talbot, H. M. Perry and A. F. Chamberlain.

Westinghouse Machine Company, The, Pittsburgh, Pa.—Turbine train lighting set; electric storage batteries for railway use. Represented by H. P. Childs, D. C. Arlington, S. B. Dusinberre and W. G. Davis.

Wright Safety Air Brake Company, Greensboro, N. C.—A device for automatically setting the brakes in event of any abnormal relation of truck to car body. Represented by John B. Wright and Clement G. Wright.

Exhibitors and Others

The Gold Car Heating & Lighting Co., New York, has on exhibition its combined pressure and vapor system of car heating controlled by the operation of one valve; a new stop valve temperature regulator, and a straight port two-piece coupler admitting of hose from 1¼ to 1⅝ in., and gaskets with 1¼, 1⅜ and 1½ in. openings.

* * *

It appears from an exhibit of the Joseph Dixon Crucible Co., Jersey City, N. J., that age and bad treatment have little or no effect on the flexibility and toughness of its silica-graphite paints. Two paint skins in its possession that were subjected to an immersion in a sulphuric acid bath for three and a half months have come through the ordeal without any apparent injury.

* * *

The Hunt-Spiller Manufacturing Corporation, Boston, Mass., is this year exhibiting piston valve packing rings, piston valve bushings, cylinder packing rings, crosshead shoes, eccentrics, eccentric straps, etc., that have been removed from locomotives and which show the superior wearing qualities of Hunt-Spiller gun iron. These are not "samples" or castings put out for test, but are parts removed from engines all of which have made good mileage in actual service in different parts of the country, and the results shown speak for themselves.

* * *

Bartley fasteners, made by the American Nut & Bolt Fastener Co., Pittsburgh, Pa., are constructed so that when applied the locking arm is bent into its locking position in an easy curve, and when it is to be removed for any cause it can be straightened out and reapplied many times, making the fastener a very cheap appliance for use on any device where a fastener is needed. When the locking portion of any fastener is bent up against a nut or bolt head at right angles a fracture of the metal is sure to take place at this point; and when such fastener is removed for any cause, the locking arm will break, necessitating a new fastener. Car repairmen, when taking off fasteners bent at a right angle, have to insert a chisel and hit the chisel with a hammer. This blow is not a light one, and the fact is that the chisel is driven down against the metal and makes a further fracture which finishes the job completely and destroys the fastener. The Bartley fastener can be removed by a hammer driving the locking arm down just far enough to let the nut pass, when the nuts can be removed and replaced, using the same fastener again. It is claimed to be the only fastener in use that can be used over again many times.

* * *

In addition to its usual line of exhibits, the McConway & Torley Co., Pittsburgh, Pa., is showing in spaces 415-419, samples of the Buhoup cast steel truck side frame and bolsters. In connection with its coupler business this company is now making a specialty of steel castings for car and locomotive work, and the new style truck slide frame should be examined by those who are interested in truck improvements.

* * *

The Creco roller side bearing displayed by the Chicago Railway Equipment Co. at exhibit space 546 to 551 inclusive, is too well known to require other than general mention. This bearing has been in successful service for twelve years or more, and the records of its past achievements and the latest designs will be fully explained by the representatives of the company.

* * *

The chimneys for railway use made by the Storrs Mica Co., Owego, N. Y., are well known to mechanical men. Its mica headlight chimneys were first adopted in 1900 and have been used continuously since that date by a number of prominent roads. The use of this device has been increased largely in the last few years. It has passed the experimental stage long since, and is a standard railway appliance.

The General Railway Supply Co., Chicago, in booths Nos. 157-9, exhibit a stub end of a steel passenger coach. This coach is equipped with automatic ventilators and we are officially informed that visitors are urgently requested to visit the booth. Cigars will be plentiful and a continuous performance, demonstrating the efficiency of the ventilators for removing the smoke from the car, will be the program if enough smokers can be procured.

* * *

The Parkesburg Iron Co., Parkesburg, Pa., has installed a private trunk line telephone connection with its Parkesburg office, preparatory to ordering all necessary fire-tubes needed during the conventions.

* * *

No exhibit is necessary to acquaint the majority of railway mechanical officials with the headlight chimneys of the Storrs Mica Co., Owego, N. Y. That company uses its space simply as a reception room this year, where everyone will be welcomed. This is space No. 23, in Entrance Hall on the west side. Samples of the mica chimneys will, however, be accessible, in case someone from an exceedingly remote corner of the railway world should be found who does not know connection to cannon respectively as explained below, for one what the product of this company is.

* * *

The National Lock Washer Co., Newark, N. J., makes over 350 different sizes and styles of nut locks. The steels used are made to its own specifications, and must pass the most exacting analytical and physical tests before acceptance. The machinery used in manufacturing is of special design, fully protected by patents, and owned by the company. The heat treatment apparatus and methods are also exclusively controlled by the company, being automatic and accurate in result. The finished product is subjected to the most rigid inspection and exhaustive tests for resiliency and toughness that its engineers and mechanics can devise, before the goods are permitted to be shipped. A minute and comprehensive system of record is employed, in which every detail of analysis, manufacture and test from start to finish is kept; a feature of great value in duplicating orders when a customer wants exactly what he had years ago.

* * *

The Davis-Bournonville Co., New York, has an exhibit of oxy-acetylene apparatus at the booth of the Commercial Acetylene Company, New York, space 201-209, where the different types of apparatus will be explained, and specimens of welding shown. The practical operation of the process can be seen in a special booth at the rear of the Greek Temple.

* * *

Frank Morrison is so busy with his official duties that the Mason locomotive reducing valve in Booth 17, in the ballroom, has to exhibit itself—and it does.

* * *

An artistic, as well as interesting feature of the National Tube Company's exhibit, booth 28, is a large photograph of the top of a table made from thousands of pieces of Shelby seamless steel tubing arranged in design. The photograph is remarkably good, showing clearly every detail of the design and the innumerable shapes and sizes of tubes composing it. The photograph is framed very attractively, and the mat is unique, being of considerable width and depth, and recessed, each containing a Shelby souvenir. The attractive Shelby paper knife, watch fob, cuff buttons and stick pin, etc., are included. The whole is enclosed in a fine mahogany frame; a brass plate on the lower molding bears an engraved explanation of the picture and its accessories. We advise visitors to examine the picture, for it certainly should be given more than a passing glance.

* * *

Every one remembers the American Blower Company's illuminated sign on the Boardwalk last year. This year the company is using its spectacular "Keep Your Eye On The Ball" exhibit for a practical demonstration of the new SIROCCO turbine type blower. As compared with the former type of steel plate fan for blower systems, heating, ventilating, mechanical draft and blast equipment. The keeping of the ball in the jet of air demonstrates both volume and pressure and the company is showing that the SIROCCO, at the same speed, will hold the ball at greater distance from the outlet nozzle than the former standard type of fan, and by use of a standard type of dynamometer, shows that it requires less horsepower for the operation of SIROCCO. Every one should see "The Little Blower" at the exhibit of the American Blower Company, Detroit, Mich., in booth 403.

* * *

One of the most interesting exhibits at the conventions this year is that of the National Railway Devices Company, Chicago, including a freight car end, on which is applied the Schroyer uncoupling apparatus, the Dohlin automatic car-door fastener and the Nichols car-door fastener; also a locomotive boiler head showing the Shoemaker firebox door operator in operation; also a reduced size main engine frame, and driving wheel in motion on which is applied the Turnbull driving wheel flange lubricator, the latter being connected up with an odometer so that the mileage made by each application of the lubricant can be recorded, thus making a positive demonstration of the practicality of this device. This exhibit is in charge of J. W. Luttrell, Frank Shoemaker and Jay G. Robinson at booth 319.

* * *

The Buffalo Brake Beam Co., New York, has an interesting exhibit of I-beams, special section and truss brake beams. It also shows a full line of brake beam forgings, consisting of heads, fulcrums, safety chain clips, wheel guards and hangers.

* * *

The Kennicott Water Softener Company, Chicago, a few months ago, issued a new sectional catalogue which has been warmly commended, not only for its fine appearance, but for its effective presentation of the various products brought out by this company. As the contents are divided into sections, it is not necessary to burden a reader with any matter other than that in which he is interested. Especial attention is devoted to the new type K softener, and those interested in this class of machinery will find much that appeals to them between the covers of "The Products of Kennicott."

* * *

The large exhibit of the Commercial Acetylene Company, New York, is located just beyond the Entrance Hall at booth 201-9 and, as usual, is full of shining lights. The arrangement of the exhibit has been carried out with a pleasing consistency, provision having been made to see the various designs of car lighting fixtures, signal lamps and headlights while resting in the reception room which has been finished in red. Incidentally an acetylene cigar lighter that "the wind never blows out" is always at your service. R. J. Faure, O. F. Ostby and H. G. Doran are in charge.

* * *

The Baker-Pilliod valve gear model, which received no little attention during the conventions last year, is again on hand at booths 496-7 of the Pilliod Company, Chicago. This model should attract more attention this year than last, especially as this form of valve gear is being used by several railways, notably the Chicago & Alton, which specified this type on 20 locomotives recently built.

* * *

The Wells tire expanding outfit is an apparatus that should appeal to wide-awake superintendents. It removes tires, with the wheels under the locomotive, in from ten to twenty minutes. It is made by the Wells Light Manufacturing Co., Jersey City, N. J.

The city of Turin, finding its business affected by the diversion of traffic from the Mont Cenis Tunnel to the Simplon Tunnel, requested the state railways to equip the Mont Cenis line for electric traction, and offered to supply a current of 3,500 kilowatts from the municipal power house at Chiomonte for $50,000 a year, which is less than the cost of production. The state railway authorities replied that even this would exceed the cost of working by steam, whereupon the city reduced its bid to $40,000, which is likely to be accepted. It is hoped to have this done in time for a great exhibition.

RUSSWIN WRENCH.

The advantage of the Russwin wrench over other makes of high-class wrenches is its pronounced durability.

The bar is drop forged out of a piece of steel of sufficient size to make the outer jaw without upsetting. This is a very important feature, and it is claimed to be the only wrench that is made this way. This avoids any possible chance of the grain of the steel becoming strained or broken.

The sliding jaw is made of semi-steel instead of malleable iron, and is reinforced on the back to prevent buckling. It is also elongated at the intersection of the screw to prevent

"The "Russwin" Wrench.

stripping. The eyes are a part of a bar instead of a part of the handle, and are steel instead of malleable. The bar is reinforced on the back where there is great strain, especially if a gas pipe is used. The handle is enlarged at the end so as to enable the user to obtain a better grip and to perfectly fit the hand. There are no sharp corners to prevent the thumb having free and easy action on the screw.

With these combined features, the Russell & Erwin Manufacturing Co., New York, does not hesitate to pronounce the Russwin wrench the strongest and most durable wrench on the market.

THE STEEL UNDERFRAME.

The steel underframe is designed on the same principles as the wooden underframe. There are, however, certain advantages, such as continuous center sills, body bolsters and needle beams which are only incorporated in the Bettendorf designs, shown at booth 200.

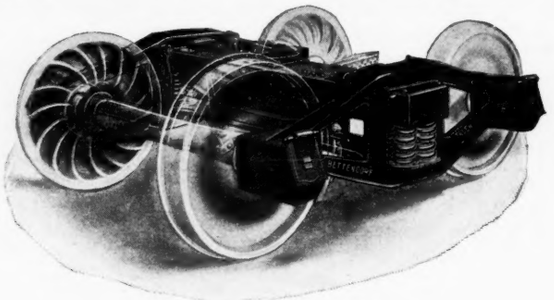
At the Bettendorf exhibit there is a 100,000-lb. gondola underframe which shows the type that is now under construction at the Davenport shops for the C. M. & St. P. A single center sill underframe is also exhibited and this type is now being built by the Bettendorf Axle Company, Davenport, Iowa, for 1,500 refrigerator cars to be furnished the Harriman Lines by the Pullman Company.

The center sill of the refrigerator car underframe has full depth between the end needle beams, and from these needle beams to each bolster, the height of the center sill is reduced gradually to 13 in. at each bolster. At each end of this reduced section the center sill is riveted to cast-steel center sill ends which extend through the end sills to striking plates. The body bolster passes through the center sill and is rigidly secured to it by malleable iron gusset castings. The body center plate is riveted to the center sill frame and is arranged to take a one-half-inch round center-pin key. The center sill ends are riveted to the center sill by 15 7/8-in. rivets. These draft-gear castings, which are specified as center still ends, are cast with all necessary lugs and holes for the application of the draft gear. The draft-check center stops are cast integral with these cast-steel center still ends.

The underframe for the 100,000-lb. gondolas has a cast-steel center-sill end, which transmits the shocks directly to the center sills. This construction permits the use of a continuous body bolster. Openings and projections are also cast in this center-sill end for any design of draft rigging.

REPAIR OF TRUCKS.

One of the questions always discussed in connection with the repair of trucks is the time required in dismantling and assembling. At the exhibit of the Bettendorf Axle Company, Davenport, Iowa, booth 200, it will be shown how the Bettendorf truck can be dismantled and assembled in 17 minutes. It will be interesting to most railway officers to know that this is true, and the best way to be absolutely sure of it in one's own mind is to visit the booth. It is possible to make this time because of the construction of the Bettendorf truck. The



The Repair of Trucks.

absence of bolts and nuts means that no delays are caused in dismantling through rusted bolts or worn threads. The necessary tools for the few operations include only two car jacks, two wooden levers or crowbars and a few wooden blocks, the brake chains being used in raising bolsters to remove springs and spring plank. After you understand how easy it is to change trucks there will be no uncertainty in your mind as to the time of changing wheels, when it is a question of the Bettendorf truck. In emphasizing this feature it is only done so that you may visit the exhibit and clear away any doubts that you may have. The truck exhibited is being built for the New York Central Lines, together with 1,000 underframes. Demonstrations are made with this truck, which is similar in design to many now in service.

GOULD SIDE-OPERATED COUPLER.

This No. 2,000 type coupler is designed to meet the demands for a side-operated coupler that is simple, positive and effective. The lateral movement in the carrier iron will not affect the lock or have any tendency to unlock the knuckle. No instructions are required for operating it, as the same movements for uncoupling are the same as common practice.

The coupler head is closed on top, excluding coal, cinders, ore or sand from the head, when used on gondola or flat cars. It is equipped with lock-set, knuckle opener, and has a large locking face to the knuckle. All the essential features of our No. 950 type of coupler are incorporated.

The lock operating stem and lever are made of steel drop forgings, insuring satisfactory results from these parts. Any design of uncoupling lever bracket may be used. A simple form of bent rod is used for the uncoupling lever and no forging or cotter keys are required.

The Gould Coupler Company, New York, is exhibiting in spaces 451-501-3-5.

KEWANEE UNION ELLS AND TEES.

Among the Kewanee specialties which attract the attention of mechanical men are Kewanee union ells and tees. The illustration herewith is of the male tee, which replaces four ordinary fittings. These combination fittings are particularly valuable in locomotive work, as they are easily connected or disconnected in close quarters.

These fittings possess all the famous Kewanee advantages, and in addition, lessen the liability to leakage, because there

Kewanee Tee.

are fewer joints, it being unnecessary to use a separate union or nipple. In brief, the combination is considered an important improvement in this line. Every man, practical or theoretical, who has anything to do with a locomotive, should visit booth No. 28 of the National Tube Company, Pittsburgh, Pa., and get well acquainted with Kewanee union ells and tees.

FEED WATER TREATMENT.

The Dearborn Drug & Chemical Works, Chicago, maker of feed water treating preparations, is represented at the convention by several members of the company in booth 8. The company laboratories, which are said to be the largest in the country devoted exclusively to the analysis and study of water, and other subjects directly relating to steam economy, as well as the company's manufacturing plant, are located in Chicago. The illustration herewith shows an interior view of the shipping department of the factory, and gives a general idea of the extent and thorough equipment of the plant. The Dearborn company owns and occupies the entire building, which is of reinforced concrete throughout and was built two years ago.

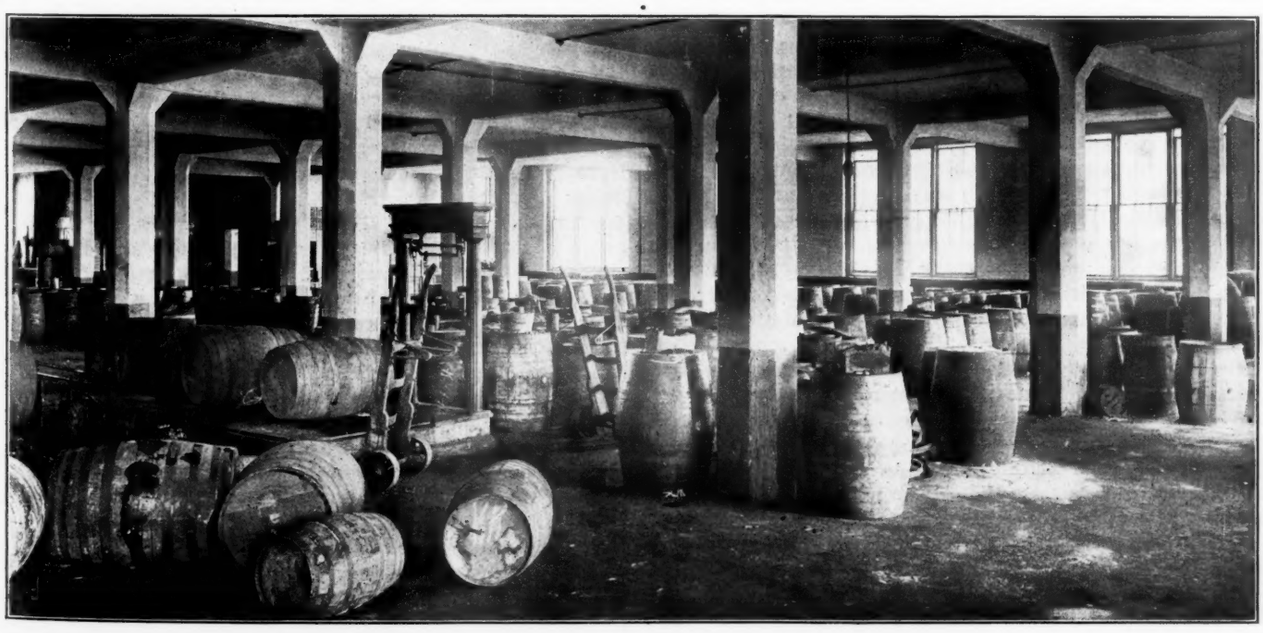
The subject of water treatment has demanded very serious and extensive consideration throughout a long period of time, and during the past 20 years, many methods and processes have been advocated and tried in practice, with varying results. Many people not conversant with the wide differences existing consider waters merely as such. The knowledge gained from the several thousand water analyses on file in the offices of the Dearborn company very strongly demonstrates the fallacy of this assumption. Different waters give widely varying results in practice, under like conditions, and many times, like waters give widely varying results under unlike conditions. This means that in order to handle the subject of water treatment intelligently, it is necessary, first of all, to determine the nature of the waters by complete mineral analyses at the hands of some man who has made a sufficient study of the proposition to become an expert in the line, and be able to foresee the results or effects which the waters would have in actual practice.

The Dearborn company was one of the first to inaugurate the system of making analyses of waters, maintaining thoroughly equipped laboratories, and employing a corps of competent chemists for the purpose of executing this work. And since the inauguration of these methods the policy of the company has been not to pass upon the quality of any boiler feed water, or recommend treatment, without first having at hand a proper analysis of the water. This scientific handling of the subject, together with the extreme care exercised in the manufacture of the company's water treating preparations, insuring uniform and high-class materials at all times, has been responsible for the success of the Dearborn company.

WESTINGHOUSE IMPROVED TRIPLE-VALVE TEST RACK.

The importance of air-brake maintenance is now so generally recognized that it is hardly necessary to emphasize the value to railway companies of keeping such equipment in good operating condition. To meet the demand that has developed in recent years, the Westinghouse Air Brake Co., Pittsburgh, Pa., has built a standard rack for testing cleaned or repaired triple valves. During the past years this rack has been improved and perfected, so that all triples, including those of the new standard freight and passenger types, can be tested thereon with the minimum of time and labor.

The Westinghouse improved triple-valve testing rack con-



Interior of Shipping Department, Dearborn Factory.

sists of a substantial hardwood table, on which is mounted a test stand and automatic clamping device for holding the triple during test; also cocks, valves, piping, reservoir, brake cylinder and the special devices necessary to approximate closely the conditions to which the triple is subjected in actual service. This rack is invariably sold complete, and all parts are thoroughly tested and assembled with the utmost care to insure uniform and accurate results in the work of testing triple valves.

One of these new racks is shown in actual operation at Atlantic City, and another with all special parts sectioned to indicate general arrangement and construction.

In addition the Westinghouse company can supply a portable yard testing truck for the purpose of testing triples on trains.

KERITE.

Kerite was evolved over half a century ago after twenty years of research by Austin G. Day, who, with his cousin, Charles Goodyear, was one of the pioneer investigators of rubber in this country.

It is doubtful if any other material or product that has been brought before a technical association has had the distinction of being vouched for by its competitors in a way that Kerite has had. In a memorandum to the Railway Signal Association's committee, dated June 19, 1908, the Rubber Covered Wire Engineers' Association's committee, representing twenty-six manufacturers, said in discussing the question of specifications, "and inasmuch as wires insulated with Kerite have been in use for fifty years and have proved their merit, we suggest that a special specification be made for them." Such praise of a competitor's product is unusual.

The reason for the excellence of Kerite as an insulator is not hard to find. In the usual rubber and mineral compounds, the Para gum is, by long-continued working on the rolls, mechanically mixed with sulphur and dry mineral ingredients, none of whose constituents have any real insulating value but act simply as a filler to the gum, which is the only active insulator in the compound, except the small percentage of wax (not over 5 per cent.) that would be permitted under the usual specifications for such compounds. In Kerite insulation, on the other hand, the specified percentage of Para gum is mixed with crude Kerite, the result of twenty years of experimentation to produce a preservative for rubber gum, which by itself is a highly perishable commodity. Not only does crude Kerite possess to a marked degree the ability to amalgamate closely with Para gum in such a manner as to prevent its deteriorating, but it is in itself an active insulator of a high order, so much so, in fact, that were it feasible to spread crude Kerite upon a wire, a highly satisfactory insulation would result. Its resiliency, however, is such that it requires the admixture of a considerable amount of Para gum to cause it to flow properly through the dies of the tubing or covering machine.

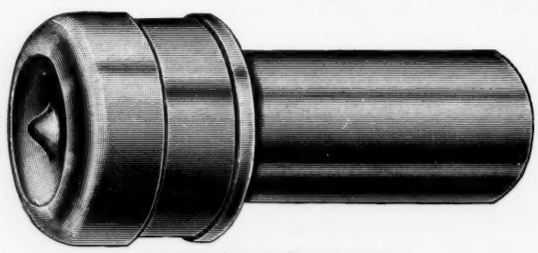
While the life of an ordinary compound is limited to that of the rubber it contains, such is not the case with Kerite insulation, as its life is limited not to the rubber it contains but to that of the Kerite. Kerite wires and cables made half a century ago are in service to-day. Other properties of Kerite insulation are: resistance to the absorption of moisture, resistance to heat, chemicals and deteriorating influences in general, and the fact that its insulation resistance, as has been proved by long-continued tests, increases with age.

Kerite wires and cables are used in all fields where electricity is employed—for aerial, underground and submarine service, for the purposes of power, lighting signals, telephone, telegraph, etc. With the Bell telephone companies Kerite is standard, and with the telegraph men it is a household word. Kerite has been specified in some of the largest and most important signal installations recently undertaken, notably that of the Frisco and that of the Hudson tunnel system in New York City. Kerite was also specified for the power cables in the Hudson tunnel system, and the conditions as affecting rubber compounds in these tunnels are considered extremely severe. To meet the extreme conditions encountered in the Canal Zone a Kerite cable was selected for the new Panama cable. The award of this contract was made to the Kerite company only after a careful investigation of the merits of Kerite compared with other insulations in this country and Europe.

The name of Kerite is always associated with that of Capt. W. R. Brixey, who recently incorporated his business under the name of the Kerite Insulated Wire & Cable Co. The general offices are in the Hudson Terminal, 30 Church street, New York, and the works, which have never stopped running since they were rebuilt after the fire during the Civil War, are at Seymour, Conn.

SCULLY STAYBOLT HEADER.

The Scully staybolt header fits a pneumatic hammer the same as a rivet set, and is used to upset and finish staybolts.



Scully Staybolt Header.

The center point holds the tool to the bolt, enabling a quick and satisfactory job to be done. Its capacity is 100 bolts an hour. It is made of tool steel, carefully tempered. The Scully Steel & Iron Co., Chicago, is the maker.

WESTINGHOUSE TRAIN-LIGHTING BATTERIES.

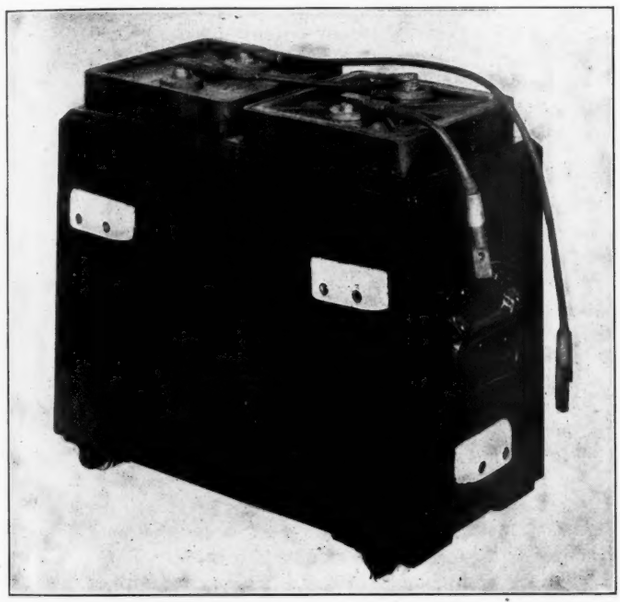
Exhaustive and elaborate tests of the Westinghouse storage batteries for train-lighting service, during the development of the Westinghouse cell, have shown the superiority of the pure-lead sulphuric-acid type, if properly designed and constructed. The Westinghouse positive and negative are made of purest lead, free of tin, antimony, or other alloy, with the active material formed from the lead itself by a Planté process with sulphuric acid as an electrolyte.

Those parts of the positive grid adapted to become active consist of a number of very small units, which are pure lead leaves or laminæ, joined, at their ends only, to round conductor ribs, which in turn end in the main stiffening ribs of the frame of the plate. These leaves are grouped in panels, 3 to 4 in. square, depending upon the particular size of plate.

The plate, including frame and leaves, is of chemically pure lead, compressed into one homogeneous piece, without joint or weld of any description. Upon the laminated surface is formed, from the lead itself, the active material—peroxide of lead. This coating of peroxide entirely surrounds each lead leaf, which remains a core of pure lead of sufficient size to furnish active material for replacing that gradually deposited in the bottom of the cell, and is also of sufficient section to provide ample conductivity during the long life of this type of battery.

When it is remembered that the volume of lead peroxide is about twice the volume of the lead from which it is made, it will be seen that ample space is provided between the leaves to accommodate all lateral expansion due to the increase in volume of the unit leaves. Also, as these units tend to in-

crease in length, the longitudinal strain results in a slight increase in the length of the panel, so that the top and bottom ribs of one panel plate are rendered slightly bow-shaped, but the two surfaces of this plate remain flat. In plates of more than one panel there are no horizontal framing ribs, but a thin corrugated sheet connects the adjacent panels. At each end of this expansion sheet a rectangular opening is provided, separating it from the vertical conductors, thus allowing all vertical growth to be taken up by the expansion sheet, which, on account of being corrugated, adds strength to the panel transversely. The rectangular openings also allow immediate diffusion and consequent equalization of the density of the electrolyte on both sides of the plate, which materially aids its uniform working. As each individual unit is independent of its neighbor, is surrounded by electrolyte, and carries only that portion of the current which its peroxide supplies, there is an absolute uniformity of distribution over all surfaces of the



Westinghouse Train Lighting Storage Battery.

Westinghouse plate that makes it unequaled for withstanding high rates of discharge.

The negative plate is similar to the positive plate, with the exception that the expansion spaces are omitted. The Westinghouse negative plate maintains its rated capacity from the initial charge, and is of such quality that it is practically indestructible.

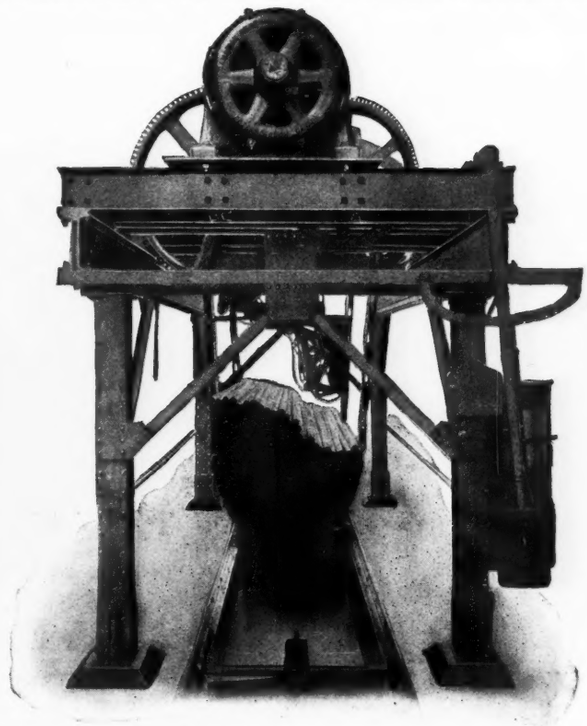
The Westinghouse Machine Co., Storage Battery Department, East Pittsburgh, Pa., will give estimates or other information on complete installations for train lighting or other service.

THE RYERSON FLUE CLEANING MACHINE.

With the advent of the Ryerson flue cleaning machine, locomotive flue cleaning has been put on a basis to compete with the work in other departments in which are installed modern high speed machines and labor saving devices. So important has been the saving effected in these machines, and so successful their operation, that they have replaced the old type of drum rattler in a number of the large railway shops of the country, and have been specified for most of the new shops which have been built or contemplated within the last two years.

This machine consists of an overhead steel frame work and a concrete pit built under the floor of the shop and partially filled with water. Flues, while being cleaned, are suspended in the water by two specially made wide-faced case-hardened, wrought-iron chains forming continuous loops in which the flues roll over and over on themselves as the chains are driven. All gearing is overhead and driven by a direct connected motor, or, if desired, by a belt. To keep the flues in position, fenders are provided in the pit and are adjustable to flues from 8 to 20 ft. in length. The rear chain is supported by a traverse carriage which is moved toward or away from the front chain by screws driven by the main driving motor, thus adjusting the chains to the length of flues handled.

One of the greatest advantages of the machine lies in the method employed to lower the tubes into the pit. This is accomplished as follows: A carload of flues is run under the over-head frame work, the chains are attached to the flues, the



Ryerson Flue Cleaner.

truck runs out leaving the flues suspended, as shown in the illustration, and then lowered into the pit and the rattling is started.

The machine has a capacity to rattle 500 2½-in. tubes at one time. To place the tubes in position for lowering requires only about four minutes and the labor to push the car in position and adjust the chains. To lower the tubes into the pit takes one man one minute, and to remove the tubes from the machine takes one man five minutes. The rattling takes place under water, making the machine practically noiseless. Furthermore the water washes out the soot and dirt from the inside of the tubes at the same time that the scale and other material is being scraped from the outside of the tube.

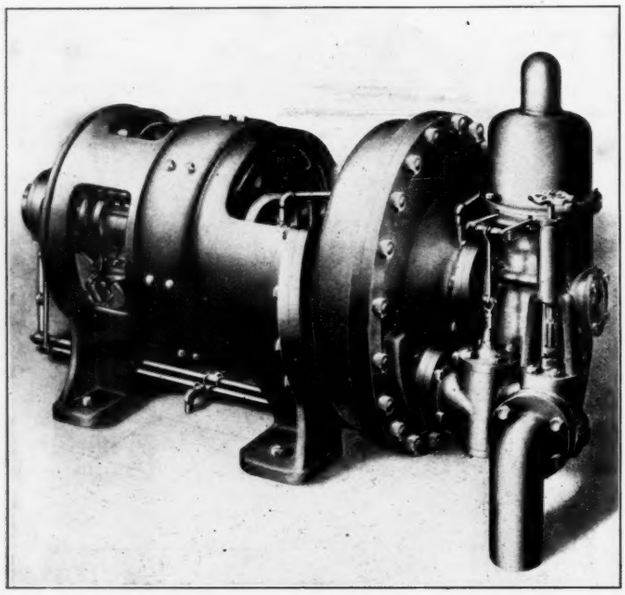
The machine is made and sold by Joseph T. Ryerson & Son, Chicago.

WESTINGHOUSE TRAIN-LIGHTING TURBO-GENERATOR SET.

The new Westinghouse train-lighting turbine generator set meets the exacting requirements of a small steam-driven generating outfit for train-lighting, excitation, or other small-power, direct-current service. Its compactness and minimum weight result from the improvements in design of both its electrical and steam elements. The generator output is 25 kilowatts at 125 volts, and it is designed to run at 3,600 revolutions per minute. The turbine element is of the impulse class, but of novel construction. A single wheel is employed,

involving a re-entrant path for the steam which is expanded practically to exhaust pressure in the nozzles.

The generator is compound-wound, insuring close voltage regulation, while its 4-pole field structure with auxiliary commutating poles makes possible diminished weight and length of commutator, and thus shortened overall dimensions. The compact structural connection between the turbine case and generator frame also contributes to shortening the overall shaft length, adapting the outfit admirably for installing, in the restricted space of the baggage car, where, in train-lighting service, it is intended to be placed. On account of the possible oscillation and vibration of the car, oil rings are not relied upon for lubrication of the two bearings. An oil pump, attached to the turbine, is provided to insure circulation of oil in ample quantity while the outfit is in operation. Provision is also made for accurately balancing the rotating part, avoiding any possible vibration that might occur.



Westinghouse Train Lighting Turbo-Generator Set.

A well-designed fly-ball governor, geared directly to the turbine, control a nickel-bronze balanced poppet valve. The governor mechanism is unique in design, insuring excellent regulation, stability, and certainty of operation. With the turbine is furnished a combined automatic and hand throttle valve, the automatic feature of which is operated by a weight held by a spring against centrifugal force, entirely independent of the main governor. The apparatus is exceedingly simple and hence certain in its operation. The device may be regulated to come in at any predetermined speed.

This train-lighting turbo-generator set is being exhibited for the first time, in the Westinghouse space at the convention exhibit.

NEW PLANT OF THE CHICAGO RAILWAY EQUIPMENT CO.

The new plant and office building of the Chicago Railway Equipment Co., at Forty-sixth and Robey streets, Chicago, was put in operation the first of the present year, and therefore has been running about six months. The final touches have been put on in that time and visitors, who are always welcome, will find this very attractive, up-to-date plant more than ordinarily interesting in its efficiency for turning out product and in its comfortable arrangements for employees.

The first floor of the office building includes the physical laboratory, exhibit room and brake-beam museum, temporary tool machine shop, tool vault, vestibule and lobby. In the testing laboratory are two Riehle testing machines, one of 20,000 lbs. capacity and the other of 100,000 lbs. capacity, the latter recommended by the Master Car Builders' brake-beam committee for 1906 for making brake-beam tests. This particular machine has been improved by the addition of supports, this feature being covered by patents owned by the Chicago Railway Equipment Co. The machine is arranged so that the brake-beam heads rest upon blocks that can be swung to give the equivalent of any height of hanging on cars and also make it possible to test the beams with torsional loads similar to those resulting from misapplication of the beams. An interesting feature of the office building is the exhibit room on the main floor, in which brake-beams of all types are shown. The beams displayed cover the history and development of the brake-beam business.

The second floor contains private offices and ante rooms, separated from the main general offices by a corridor in the center of the building. A special feature of this building is the system of vaults. The general office vault extends through all three floors of the building, a spiral metal stairway connecting the different vault floors. All of the vault equipment is of metal, including the files and tables. On the third floor is a large drafting room, with its electric blue-printing machine. On the west side of this floor is an attractive and commodious café where luncheon is furnished the office force. A private dining room for the officers of the company, and for guests, adjoins the café.

The erecting shop is 600 ft. x 160 ft., with space for duplicating the same when necessary. The raw material enters at one end and the finished product is taken out at the other. Special provision has been made for repairing brake-beams, a generous amount of space being provided for this purpose. Repaired beams receive the same final tests as new beams. There are two 75,000-lb. steam testing machines over which every new or repaired beam passes in its course through the shop. The buggy system for distribution of materials is used and, as arranged, is most convenient and efficient.

The office building and shop have all modern sanitary conveniences and the most modern type of metal lockers are provided for the workmen. The power station of the plant, which is in its own individual building, has a full equipment of steam, electric, hydraulic and air machinery.

Plant of Chicago Railway Equipment Co.

CHARCOAL IRON TUBES.

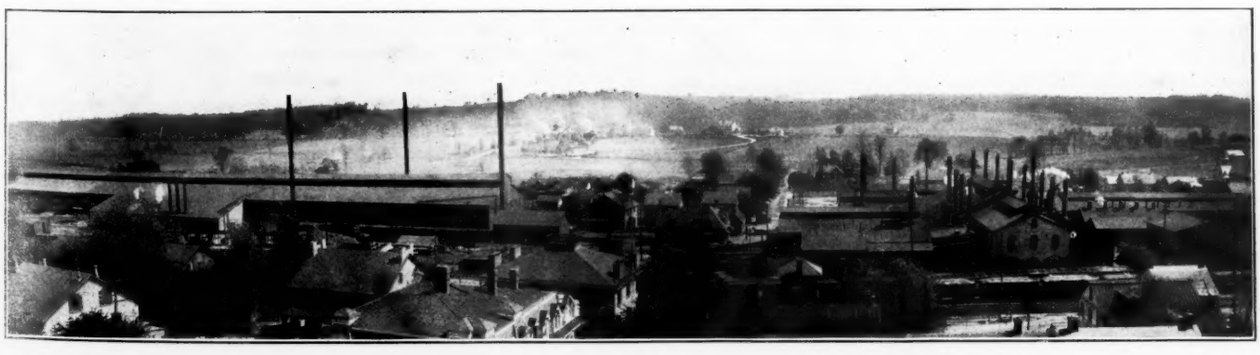
The Parkesburg Iron Company, whose plant is located at Parkesburg, Chester County, Pa., has during the past forty years made a specialty of charcoal iron for locomotive boiler flues. In the past, this iron in the form of skelp was used by the different tube mills in the country, notably the Allison Manufacturing Co., later the Allison Works of the National Tube Company, Pittsburgh, Pa., which mill took a large part of the annual output, amounting to 20,000 tons.

The new Parkesburg tube mill, illustrated herewith, was built during 1908, and since November of that year has been in operation, its product consisting exclusively of high grade knobbled hammered charcoal iron tubes. The tube mill building is 625 ft. by 85 ft., and is served in all parts by a 10-ton crane. The furnaces, one bending and two welding, were built by the S. R. Smythe Co., Pittsburgh, Pa., and have given very good results, 1600 heats of 2 in., No. 11 flues from one furnace in ten hours having been obtained. The machinery, built by the United Engineering & Foundry Co., Pittsburgh, Pa., is all electrically driven, and with its complement of tables very largely eliminates manual labor.

Interior of New Parkesburg Tube Mill.

The inspection at the finishing end, as is the case with the inspection of skelp at the old mill, is most rigid, the aim being to ship only tubes which are as nearly perfect as possible.

In this age of steel, when large tonnages are an essential part of successful mill practice, it has been gratifying to the management of the Parkesburg Iron Company to find firmly intrenched in the minds of many railway officials from all parts of this country the belief that there is a growing demand for a fine quality of charcoal iron tube. Their experience is that for safety and durability a tube made in the old fashioned way from charcoal iron is the cheapest and most satisfactory.



Plant of the Parkesburg Iron Company.

REFLEX WATER GAGE.

In the interesting exhibit of the Nathan Manufacturing Co., New York, is included the Reflex water gage (Klinger's patent). The advantages claimed for this type of water gage are: 1. Quick and reliable observation of the water level. 2. Absolute safety against injuries to enginemen. 3. All other protective devices, such as wire netting, slotted tubes, etc., which do not admit of ready observation of the water level, become superfluous. 4. Easy application to all existing boiler mountings. The water appears black, while the steam shines with a silvery luster, producing a very marked contrast between the steam and water space. This effect is produced by the peculiar shape of the observation glass. With the use of these glasses, breakage is reduced to a minimum. If the glass should accidently break, it will still remain and be held fast in the frame or casing, and will not fly about as the ordinary tubular glass does when it breaks, for which reason the enginemen are fully protected against injuries from flying glass. No Reflex glass is of the "genuine" Klinger type and make unless it is provided with the

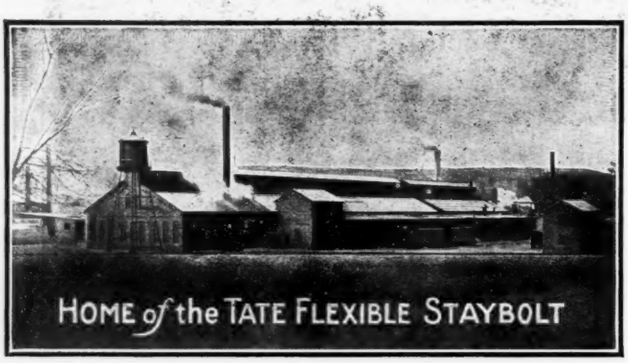
Klinger water mark on the face of the glass. All others are imitations.

PROGRESS OF THE FLEXIBLE STAYBOLT.

BY B. E. D. STAFFORD.

Five years ago the Tate flexible staybolt was first brought to the attention of the railway world by the Flannery Bolt Co., Pittsburgh, Pa., which was organized to manufacture and sell the Tate bolt believing it to be the article of mechanical merit and worthy the consideration of railway mechanics who were experiencing no end of trouble with the ordinary rigid staybolt, and meeting with little or no success in their efforts to reduce costs of firebox maintenance with staybolts continually breaking, and fire sheets cracking, to an extent that was not only costly in view of the resulting repairs, but perplexing and expensive on account of withholding locomotives from road service, thereby reducing the earning value of the engine in proportion to the time lost necessary to keep the fireboxes intact and in serviceable and safe condition.

It is most difficult to realize the amount of energy expended and vigilant work exercised by the organization of the Flannery Bolt Co. for the purpose of demonstrating conclusively that flexible staybolts were necessary to the more economic maintenance of the locomotive firebox than the rigid stay, inasmuch as the measure as a whole was revolutionary and



Flannery Bolt Company Factory.

directly opposed to the methods in vogue, when first the Tate flexible staybolt was exploited. The method of rigidly staying the firebox was deeply established in the mechanical minds as the right way, notwithstanding constant and ever recurring trouble due to continual renewals of broken staybolts, cracked fire sheets and shopping of engines, etc. Progress with the Tate bolt in the introductory period was accordingly limited, but the use of it gradually advanced in proportion to the amount of service rendered compared to the rigid staybolt. The Tate flexible staybolt has had to prove its value step by step in firebox practice under all conditions of service operation, from the basis of six bolts to an engine applied to bad localities, to a complete installation when such could be made. In almost all cases the result was so satisfactory that it led to a far greater use and at the present time over one hundred railways have the Tate bolt in service, a large number of which recognize that it is a necessary and most vital factor in solving the staybolt and firebox problems of the past.

Much has been accomplished by the use of the Tate flexible staybolt during this period in demonstrating beyond doubt that flexible connections to the firebox assemblage is essential to the economic working and maintenance of the locomotive boiler as a whole, and that the flexible staybolt properly applied in regions of firebox construction where expansion is the greatest, the bolts being adjusted longitudinally to compensate for the difference of expansion between outer plate and firebox sheets, renders a condition more satisfactory as to safety and method of construction with the flexible stay. The outer shell of boiler and firebox sheets in their relative course of expansion assume the natural position under working conditions with less liability to distortion, bending and buckling, as when rigidly stayed, and in consequence, flue and seam leakage has already been overcome, staybolt breakage largely if not entirely eliminated, and fire sheets remain in good condition free from cracks, subject only to the disintegrating influences of bad water and the effects of overheating resulting therefrom.

Rigidity of firebox construction is unquestionably the main source of injury to the material make-up of the locomotive boiler. The difference in the amount of expansion between the outer shell and firebox plates has heretofore been largely if not entirely ignored, and all connecting parts such as staybolts, braces, etc., holding the complete assemblage rigid, are subjected to the stress incidental to the difference in expansion when all parts are heated in the performance of the boiler under operation. Fatigue, fracture, rupture and breakage among the rigid connections is the inevitable outcome, rendering the whole proposition unmechanical, insecure and costly to maintain.

The Tate flexible staybolt is recognized as the most perfect of all flexible stays, because: it is made in three parts and is easy to install and inspect; it affords a clear water space; it can be longitudinally adjusted to meet the differences of outer shell expansion over firebox sheets; and in its general construction of parts is first-class in every particular as regards the quality of material and workmanship.

Service records of the Tate flexible staybolt compared to the rigid staybolt point conclusively to the Tate bolt as being not only the most economical bolt to maintain and use, but in all respects better adapted as a stay for all heat-absorbing surfaces to meet the stresses involved and afford relief to the firebox under expansion than the rigid stay, rendering connections less liable to premature fracture, final rupture and breakage.

Over two million Tate flexible staybolts are in service, with so low a percentage of breakage for the service rendered that it is really an item of insignificant value, inasmuch as the cause of all breakages found were practically due to the stress resulting from the amount of longitudinal expansion of outer shell of boiler in excess of the expansion of the firebox sheets where bolts were not adjusted accordingly. Engines three years old with large installations of the Tate bolts adjusted to the difference of expansion of boiler shell over firebox have given no trouble in any particular; in fact, when the Tate bolts are properly applied they will outlast the life of the average firebox without any expenditures other than the first cost.

The Flannery Bolt Co. has added to its shop facilities in view of the increasing demand for the Tate flexible staybolt, and feels assured that the general tendency is to provide flexible connections throughout locomotive firebox construction in view of the service showing of the Tate bolt, which has proven advantageous over the rigid stay. The question of complete flexible installations is one that is being considered in order to render ideal conditions in the method of firebox assemblage and render the locomotive more serviceable as an earning power with less charges to maintain.

The general offices of the Flannery Bolt Co. are in the Frick building, Pittsburgh, Pa., with factory at Bridgeville, Pa. James J. Flannery is President; James C. Gray, Vice-President; Joseph M. Flannery, Secretary; H. A. Neeb, Treasurer; B. E. D. Stafford, General Manager; and F. K. Landgraf, Shop Superintendent and Mechanical Engineer. J. Rogers Flannery & Co. have the exclusive sales agency for Tate flexible staybolts, with offices in the Frick building, Pittsburgh, Pa., represented by Harry A. Pike, in eastern territory, W. M. Wilson in western territory, Commonwealth Supply Co. in southeastern territory. Tom R. Davis is Mechanical Expert.